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ABSTRACT

A project was conducted in Florida between October 1, 1984, and August 31, 1985, to develop and field test criterion-referenced tests in the occupational areas of gardening/groundskeeping and landscape operations. The test instruments were constructed around the performance standards developed by the Florida Department of Vocational Education. These standards were first validated by incumbents in the field and a task analysis was constructed for all the standards verified. As a result of the project, two multiple-choice written tests of 193 questions each and performance standards to assess a student's competency in the occupational area of gardening-groundskeeping and landscape occupations and one test of 56 questions covering landscaping tasks not covered in the first two were constructed. The bulk of this document consists of appendices including the task list for gardening-groundskeeping and the two forms of the mastery tests for that occupation; a task list and mastery test for landscape operations and performance tests for six jobs that must be demonstrated; a description of the field test sites; item analyses tables; and task analyses for the gardening-groundskeeping and landscape operations occupations. (KC)

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FINAL REPORT

DEVELOP AND FIELD TEST WRITTEN
and
PERFORMANCE STUDENT ACHIEVEMENT MEASURES
for
GARDENING - GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

Grant No. 011-1515-5-1611
From Oct. 1, 1984 to August 31, 1985

Department of Agricultural & Extension Education
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Gainesville, Florida

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The project reported herein was conducted pursuant to a grant from the Division of Vocational Education, Florida Department of Education. Contractors undertaking such projects are encouraged to express freely their professional judgments in the conduct of the project. Points of view or opinions stated do not necessarily represent the official position of policy of the Florida Department of Education.

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TABLE OF CONTENTS

Narrative	Page 1
Appendix A - Task List: Gardening-Groundskeeping	11
Appendix B - Mastery Tests: Gardening-Groundskeeping	19
Form I	20
Form II	44
Appendix C - Task List: Landscape operations	67
Appendix D - Mastery Test: Landscape Operations	70
Appendix E - Performance Test I	79
Job 1	80
Job 2	83
Job 3	86
Job 4	89
Job 5	92
Job 6	96
Appendix F - Field Test Sites	99
Appendix G - Tables	101
Appendix H - Task Analysis: Gardening-Groundskeeping	Supplement A
Appendix I - Task Analysis: Landscape Operations	Supplement B

Problem

To adequately prepare students for the world of work, instructional models in vocational education have stressed building the curriculum around performance standards or behavioral objectives that industry recognizes as skills and abilities most needed by entry level employees.

With regard to performance standards in competency based education, Moss (1977) wrote: "Competency-based vocational education is more than just a logical effort to clarify goals and to familiarize students with those goals. It means setting behavioral objectives for specific occupational tasks, teaching those tasks and evaluating students on the basis of their performance of the actual tasks. The instructional emphasis is thereby shifted from the traditional time-based to outcome-based principles."

Program effectiveness and student achievement can be measured by how many of the performance standards the student has mastered. Instruments (test) designed especially for this purpose are known as "criterion-referenced tests" (Hambleton and Novick, 1972).

Criterion-referenced tests are defined as a test "made of items keyed to a set of behavioral objectives" (Ivens, 1970). A criterion referenced test is "one that is deliberately constructed so as to yield measurements that are directly interpretable in terms of specific performance standards" (Glaser and Nitko, 1971)

The performance standards and task list used to develop these tests came from several sources. The Gardening-Groundskeeping Catalog of Performance Objectives, Criterion-References Measures and Performance Guides (V-TECS) was the source of 150 tasks. Additional tasks, not listed in this catalog, that were identified as being related to the Florida Department of Education Curriculum Framework for Landscape Operation were drawn from other sources, primarily the V-TECS catalog for Garden Center Salesperson, Garden Center Worker and Landscape Designer.

The purpose of this Student Assessment Project was to develop and field test criterion-references tests in the occupational area of Gardening/Groundskeeping and Landscape Operations. The test instruments were constructed around the Performance Standards developed by the State Department of Vocational Education.

OBJECTIVES

The specific objectives of this Student Assessment Project were to:

1. Verify the validity of the tasks listed in the V-TECS Gardening-Groundskeeping catalog
2. Identify tasks important to Landscaping occupations not listed in the Gardening-Groundskeeping catalog
3. Develop a task analysis for all the tasks identified
4. Develop written, criterion-referenced text instruments based on the tasks identified
5. Develop "hands on" criterion-referenced performance test items based on the tasks identified
6. Field test the written test items during 1985

METHODS

OBJECTIVE 1:

To help verify the validity of the task list, a group of incumbent workers were used in a consulting role. These people were identified and contacted from a list of members of Florida Nursery Growers Association (FNGA). Individuals who agreed to help were given copies of the task list and were asked to do the following:

1. Read each task and performance objective.
2. Indicate if you think this task should be changed in any way or eliminated from the list.
3. Describe any tasks that are not on the list of that you feel should be added.
4. Make any other comments that you find appropriate.
5. Write directly on the pages.
6. Return the entire package to me as soon as possible in the envelope provided.

Additional input as to the validity of the tasks listed was obtained from Vocational Agriculture teachers who served as consultants in a later stage of the project.

OBJECTIVE 2:

Additional tasks important to Landscaping occupations but not included in the Gardening-Groundskeeping catalog were identified from several sources. Duty areas from the Department of Education Curriculum Framework for Landscape Operations were used as broad categories. Individual tasks were drawn from other V-TECS catalogs or were identified by consulting workers or teachers.

OBJECTIVE 3:

Task analysis were developed for the 150 tasks listed in the Gardening-Groundskeeping catalog and for the additional Landscape Operations tasks.

The task analysis includes the activities involved in performing the task, tools and materials needed, safety hazards associated with the task, science, math, communications and psychomotor skills needed and the key points for proper performance of the task.

OBJECTIVE 4:

Given the task lists and the necessary funding, the project staff contracted with a group of Horticulture instructors to serve as consultants on the project. Teachers were invited to participate in the project on the basis of the recommendations of the regional consultants for Agribusiness and Natural Resources Education from each of Florida's three regions. The invitations resulted in seven teachers being contracted with as project consultants. Their primary responsibilities were to consult with the project director in the development of performance tasks and to develop multiple choice written test items. The terms of the contract were that the teachers would attend a one day workshop on multiple choice test item construction and performance test development. The test items were to be turned in within one month of the workshop date. In return, the teachers would receive three dollars for for each usable test item submitted.

At the workshop, teachers were provided materials on test item writing from the National Test Item Writing Institute (NOCTI) and a task analysis for the task list developed by the project director

Time was also taken during this workshop to identify and describe appropriate performance tasks for the "hands on" portion of the tests and to discuss all other phases of the student assessment project. The tasks in the OPPS list were divided evenly among the teachers such that at least one and no more than two teachers would be writing test items for any one task. This insured that test items would be written for each task and at the same time prevented duplication of items.

Approximately 400 usable test items were submitted by the participating teachers. The project director also wrote a number of test items and a test item bank of 450 questions was developed.

The written test items were divided into two parallel forms, form I and form II. These forms were submitted for review to consulting Vocational Agriculture teachers and to faculty members of the University of Florida College of Agriculture. Revisions in items construction and technical content were incorporated into the tests as recommended by the reviewers.

Test items were written, edited and cataloged using a TRS 80 micro-computer and the EXAMS software package (Shenendoah Software, Inc.). This program allowed for easy revisions of test items and provided an efficient method for sorting and arranging test items keyed to a specific task number.

OBJECTIVE 5:

A number of "hands on" criterion-referenced performance test items were developed with the assistance of consulting teachers. These items were based on the tasks identified as important for Landscaping occupations.

OBJECTIVE 6:

Field testing of the written and performance tests was conducted over a two-month period. A preliminary field test was held with the class of one of the teachers who had written test items. Nineteen students participated in this field test, with nine completing form I and ten completing form II. The data from the preliminary field test was analyzed for item difficulty, item discrimination and point biserial correlation.

A Kuder-Richardson 20 was computed as an indicator of test reliability. Due to the small number of students in this sample, no changes were made in the tests based on the statistical analysis. The test items were reviewed however for grammatical and typographical errors and for problems in test item construction, and some minor revisions resulted from this field test.

The second field test was held in six schools with 44 students completing form I and 44 students completing form II. The field tests took place in June and July of 1985.

One problem encountered in field testing the items with high school students was that some students would fill in their answer sheets without reading the questions. An effort was made to identify the answer sheets filled out in this manner and to remove them from the sample prior to analysis.

The results of the second field test were subjected to the same item analysis used for the analysis of the preliminary field test. Based on this analysis, revisions were made for a number of items. The response to the distractors for each test item was examined to ensure the validity of the question.

Instruction booklets for the administration of the performance tests for both the student and the examiner were developed following the format recommended by the National Occupational Competency Testing Institute (NOCTI), and used in other student assessment projects at the University of Florida.

The project manager administered the field tests with the help of the local teachers.

RESULTS

The results of this project consists of two multiple choice written tests of 193 questions each (Appendix B) and performance of to assess a student's competency in the occupational area of Gardening-Groundskeeping and Landscape Occupations and one test of 56 questions covering Landscaping tasks not covered in the first two. Also included in the results of this project are an examiner's guide, student instruction booklet, evaluation sheets for the performance tests and a list of the materials needed for the performance tests.

Statistical analysis of the field testing results was carried out using the facilities of the Office of Instructional Resources at the University of Florida. The written tests have reliability estimates of .95 for form I and .93 for form II (Tables 2 & 3)

The written tests have mean item difficulties of .47 for form I and .52 for form II. The mean item discrimination figures for the written tests are .37 for form I and .27 for form II.

RECOMMENDATIONS

These student assessment tests can be used by teachers of Landscape Operations to evaluate both their students and the program itself. All of the test items were developed in direct relation to the list of performance tasks developed by the State of Florida Department of Education. The assessment tests are, therefore, a reflection of the skills needed for entry level employment in the occupational area of Landscape Operations and Gardening-Groundskeeping.

The results of these tests will provide educators with two pieces of information. First, the level of proficiency of individual students in the occupational area of Gardening-Groundskeeping will be measured. Second, the test results can reveal areas of weakness in the course of instruction and serve as a guide in the planning of future instruction.

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APPENDIX A

TASK LIST

GARDENING - GROUNDSKEEPING

STUDENT OCCUPATIONAL COMPETENCY ACHIEVEMENT TESTING
ENTRY LEVEL SKILLS
GARDENING-GROUNDSKEEPING
LANDSCAPING OPERATIONS

A. ORGANIZING AND PLANNING

1. Write job descriptions for groundskeepers
2. Determine personnel requirements for groundskeepers
3. Schedule leaves or vacations
4. Plan security programs
5. Develop priority schedules for completing groundskeeping tasks
6. Establish performance standards
7. Assign tasks to groundskeeping crews
8. Develop fertilization schedules
9. Develop procedures for improving soils
10. Compile information necessary for purchasing chemicals for shrubs, trees, and lawns
11. Arrange for transportation of materials purchased

B. DIRECTING AND IMPLEMENTING

12. Develop rules and regulations
13. Develop rules for playgrounds
14. Develop work methods and procedures
15. Establish safety regulations
16. Counsel employees about absenteeism
17. Recruit employees
18. Interview and select employees
19. Perform personnel actions such as promoting an employee
20. Perform personnel actions such as firing an employee

21. Conduct or participate in staff meetings
22. Conduct or participate in staff meetings
23. Keep an inventory of plants, equipment, and supplies
24. Direct inspection activities
25. Improve work methods and procedures
26. Order replacements for plants, equipment, and supplies

C. INSPECTING/EVALUATING

27. Keep employee work records
28. Evaluate employee performance
29. Evaluate suggestions or complaints
30. Investigate accidents or incidents
31. Analyze work-load requirements
32. Evaluate layout of shop and facilities
33. Evaluate procedures for storage of items
34. Evaluate the maintenance of equipment
35. Evaluate capabilities of equipment
36. Initiate claims for deficient or damaged equipment
37. Take soil samples
38. Send soil samples for analysis
39. Read and interpret soil test analysis

D. OPERATING EQUIPMENT

40. Drive a pickup truck
42. Drive a tractor
43. Prepare soil for planting grass with rotary tiller
44. Compact a cultivated area of soil with lawn rollers

45. Apply fertilizer with centrifugal spreader
46. Apply fertilizer with drop-type hopper spreader
47. Apply a chemical with a hand sprayer
48. Calibrate tractor-mounted sprayer
49. Apply a chemical with a tractor-mounted sprayer
50. Edge a sidewalk with a power edger
51. Rake leaves with a power rake
52. Remove debris with a vacuum rake
53. Mow grass with a reel-type mower
54. Mow grass with a rotary mower
55. Cut grass with power scythe
56. Load topsoil on truck with front-end loader
57. Dig a drainage ditch with a backhoe

E. CONSTRUCTING AND MAINTAINING FACILITIES

58. Clean rest rooms
59. Clean grounds of leaves and litter
60. Construct a plant-holding arbor
61. Dispose of pesticide containers
62. Dispose of prunings
63. Construct fences
64. Revitalize sod
65. Sweep streets or parking lots
66. Repair streets
67. Repair driveways
68. Apply salt to icy sidewalks or streets
69. Repair a masonry retainer wall

- 70. Set stones
- 71. Paint lawn furniture
- 72. Dig drainage ditches
- 73. Clean drainage ditches
- 74. Clean ornamental pools
- 75. Clean and refill pools
- 75b. Repair irrigation lines and spray components

F. MAINTAINING PLANTS

- 76. Remove grass from flower bed edges
- 77. Remove weeds and grass from flower beds
- 78. Plant annual flowers
- 79. Transplant bulbs
- 80. Add mulch to new seedlings
- 81. Water plants
- 82. Prune shrubs
- 83. Prune shrubs
- 84. Prune and trim shrubs
- 85. Prune and trim trees
- 86. Prune hedges
- 87. Identify flammable chemicals
- 88. Store agricultural chemicals
- 89. Check plants for insects
- 90. Apply chemical treatments to diseased plants
- 91. Apply chemical treatment to plants infested with insects
- 92. Apply weed-killing compounds to lawns with a compressed-air sprayer
- 93. Apply weed-killing compounds to lawns
- 94. Transplant trees
- 95. Transplant trees

- 96. Brace newly planted trees
- 97. Brace newly planted trees
- 98. Train plants and shrubs (Espaliering)
- 99. Train plants and shrubs (Pleaching)
- 100. Build supporting structures for training vines
- 101. Treat cavities in trees
- 102. Apply tree paint to tree wounds
- 103. Brace overloaded limbs or branches
- 104. Remove stumps with a stump router
- 105. Remove dead or unwanted trees
- 106. Gird trees
- 107. Construct covers to protect plants from weather
- 108. Wrap trees or shrubs to protect from weather
- 109. Construct covers to protect plants from weather
- 110. Fill in holes or depressions in lawn
- 111. Sod worn spots in lawn

G. PREPARING AND IMPROVING SOIL

- 112. Prepare a compost
- 113. Apply compost
- 114. Prepare a seedbed for lawn areas
- 115. Convert subsoil to topsoil
- 116. Haul and spread topsoil
- 117. Sterilize soil with liquid soil fumigants
- 118. Sterilize soil with granular or powdered chemicals
- 119. Aerate sod
- 120. Apply fertilizer by the "punch bar" method

- 121. Control soil erosion caused by water
- 122. Control soil erosion caused by wind

H. MAINTAINING EQUIPMENT

- 123. Clean and sharpen hand tools
- 124. Replace handles for tools
- 125. Repair leaking faucets
- 126. Repair extension cords
- 127. Sharpen rotary mower cutting blade
- 128. Replace cutting blade on power scythe
- 129. Service rotary blade grinder-balancer
- 130. Clean centrifugal fertilizer applicators
- 131. Lubricate vacuum rakes
- 132. Lubricate centrifugal fertilizer applicators
- 133. Lubricate a tractor
- 134. Add oil in small engines
- 135. Change engine oil
- 136. Check tires for pressure, wear, and defects
- 137. Replace spark plugs in tractors
- 138. Replace breaker points on a tractor
- 139. Replace radiator hoses
- 140. Service carburetor air cleaners on small engines
- 141. Adjust engine idle speed on small engines
- 142. Service belt drives on groundskeeping equipment
- 143. Service chain drives on groundskeeping equipment
- 144. Service gear drives on groundskeeping equipment

- 145. Service variable speed drives on groundskeeping equipment
- 146. Prepare equipment for painting
- 147. Paint equipment
- 148. Clean and oil electric motors
- 149. Order repair parts for vehicles or other equipment

APPENDIX B

MASTERY TESTS

GARDENING - GROUNDSKEEPING

Written Form I
Written Form II

Form I

1. Which of these tasks is likely to be a responsibility of a groundskeeper?
 - A. Landscape design
 - B. Propagating nursery stock
 - C. Replacing dead and diseased plants
 - D. Foliage production
2. In maintaining an established lawn, the recommended watering practice is to:
 - A. sprinkle lightly every night
 - B. water thoroughly every night
 - C. water thoroughly when the lawn shows signs of wilt
 - D. sprinkle for a half hour every morning
3. One person can mow an area 25 feet by 75 feet in 5 hours. How many hours would it take 4 people to mow an area twice that large?
 - A. 2 hours
 - B. 2.5 hours
 - C. 3 hours
 - D. 3.5 hours
4. Vacation times for employees should be scheduled:
 - A. consecutively
 - B. by seniority
 - C. during the same period of time
 - D. during off-peak or slow work periods
5. One of the most efficient and accurate forms of nighttime security for a grounds area is:
 - A. personal identification
 - B. electronic alarms and surveillance equipment
 - C. fluorescent lights
 - D. periodic police checks
6. The most important factor to consider when setting priorities for a work schedule is:
 - A. the capabilities of the workers
 - B. the time required for the task
 - C. deadlines and importance of the task
 - D. number of workers
7. Which of these conditions is most suitable for fungal infections of plants?
 - A. High humidity
 - B. High light
 - C. Low light
 - D. Dry conditions

8. How often should St. Augustine and Bahia grass be mowed during the summer to maintain an attractive and healthy appearance?
 - A. Every day
 - B. 7 to 10 days
 - C. 12 to 14 days
 - D. 14 to 21 days
9. What type of mower should be used if a lawn is to be mowed to a height of 1 inch or less?
 - A. Rotary mower
 - B. Reel mower
 - C. Vertical mower
 - D. Riding mower
10. A pH reading of 6 is considered:
 - A. slightly basic
 - B. slightly acidic
 - C. extremely basic
 - D. extremely acidic
11. Which of these is most often used as a cover crop to improve soil?
 - A. Mondo grass
 - B. Legumes
 - C. Bahia grass
 - D. Blue Fescue
12. Which of these could be used to rid the soil of nematodes?
 - A. Vapam
 - B. Zineb
 - C. Maneb
 - D. Benomyl
13. Which of these is a general purpose insecticide that can be used to control sucking insects?
 - A. Dursban
 - B. Kethane
 - C. Malathion
 - D. Lindane
14. The best type of vehicle to use in transporting shrubs is one that is:
 - A. open-sided to allow good ventilation
 - B. closed-cover to prevent wind damage
 - C. open, high-sided for maximum load
 - D. flat-bedded to prevent crowding
15. Personnel policy should include information on:
 - A. accident reporting
 - B. vacations
 - C. wages
 - D. all of the above
16. Rules for playground use should:
 - A. be posted at the place of entry
 - B. describe boundaries for recreational activities
 - C. list proper use of equipment
 - D. all of the above

17. When a new method for performing a task is implemented:
 - A. old methods should be discarded
 - B. records should be kept to compare old method with new
 - C. new equipment should be purchased
 - D. all of the above
18. Which is the best way for an employer to prevent a reoccurring problem of absenteeism among staff members?
 - A. Inform employees of company policy after one absence
 - B. Inform employees of company policy before they are hired
 - C. Address the subject at a weekly staff meeting
 - D. Fire one or two staff members to set an example
19. Which of these methods would provide the greatest exposure for recruiting new employees?
 - A. Verbal communication with existing workers
 - B. Verbal communication with the community
 - C. Inquiries with similar businesses
 - D. Radio and television advertisement
20. Which of these subjects should be discussed during a job interview?
 - A. Applicant's work experience
 - B. Applicant's reason for seeking job
 - C. Working conditions and fringe benefits
 - D. All of the above
21. What would be the best procedure to follow if an employee begins showing a poor attitude towards the job and becomes careless about work?
 - A. Take no action and allow the employee to work the problem out
 - B. Fire the employee
 - C. Make a note in personnel records regarding workers behavior
 - D. Hold a private conference with the employee
22. Which is the most desirable way to conduct a staff meeting?
 - A. The supervisor presents all the material
 - B. The agenda is prearranged
 - C. No agenda is set to allow for open discussion
 - D. Topics address problems of individual staff members
23. Which of these factors should be considered when reordering stock?
 - A. Trends in sales volumes
 - B. Purchase needs
 - C. Comparison of sales to stock
 - D. All of the above
24. Which of these is used to measure soil moisture?
 - A. Hygrometer
 - B. Tachometer
 - C. Hydrometer
 - D. Trichometer
25. Which is the best reason for seeking new methods for performing a job?
 - A. Provide variety for employees
 - B. Improve cost efficiency
 - C. Use equipment in different capacities
 - D. Provide incentive for employees

26. What factors should be considered when determining quantities of items to be reordered?
- A. Inventory list
 - B. Future work schedule
 - C. Stock required for future jobs
 - D. All of the above
27. How often should employee work records be recorded in permanent files?
- A. Once a week
 - B. Once a month
 - C. Once every 6 months
 - D. Once a year
28. Before evaluating an employee's performance, a supervisor should:
- A. review other employees' records for comparison
 - B. describe what the evaluation will consist of
 - C. discuss the employee's work habits with other workers
 - D. advise the employee to improve work habits before the evaluation time
29. What should be done with suggestions or anonymous complaints submitted by employees?
- A. They should be filed for later reference
 - B. They should be posted on the bulletin board
 - C. They should be discussed at staff meetings
 - D. They should be disregarded
30. Accident reports should be filed by employees:
- A. at the end of the work week
 - B. only when bodily harm occurs
 - C. at the end of the work day when the accident occurred
 - D. only when property damage occurred
31. What course should be followed when investigating an accident involving a worker and power equipment?
- A. Question witnesses and formulate conclusions
 - B. Question the injured worker, inspect the equipment and formulate conclusions
 - C. Inspect the equipment and arrange for quick repair
 - D. Clean the area and resume operations as soon as possible
32. Which of these are the most important in evaluating shop facilities?
- A. The amount of tools and equipment on hand
 - B. The age and condition of tools and equipment
 - C. Overall design, efficient use of space, neatness and safety features
 - D. How accessible the shop is to employees
33. Pesticides should be stored:
- A. where they are easily accessible
 - B. only in the original, labeled container
 - C. where other supplies are stored
 - D. in the feed shed where they will stay dry

34. The best procedure to follow when initiating an insurance claim for a damaged piece of equipment would be to:
- A. fill out the insurance form and estimate the cost of the damage
 - B. record the serial number, describe the damage, complete the form and call the insurance adjuster
 - C. fill out the form and return the damaged item to delivery company
 - D. complete the form, write a damage estimate and hire a lawyer
35. A soil analysis shows that an area is low in Nitrogen and Potassium. Which of these fertilizers would be best to apply?
- A. 30-0-0
 - B. 15-0-15
 - C. 0-10-15
 - D. 0-10-20
36. If the radiator on a pickup truck develops a leak while on the road, one should:
- A. remove the radiator cap, add water and replace cap
 - B. remove the radiator cap, add water, leave the cap off and add water as needed
 - C. drive back to base at a slow speed
 - D. call or walk for help
37. A truck should never be operated under which of the following conditions?
- A. Coolant temperature gauge is out
 - B. Oil light remains on or oil pressure gauge shows 0 oil pressure
 - C. Low tire pressure
 - D. Radiator has a small leak
38. Before starting a tractor, always check which of the following?
- A. Air pressure in tires
 - B. Oil level in crankcase and coolant level
 - C. Oil level in the oil bath air filter
 - D. Oil level in the transmission
39. The most important safety check before starting a tractor is to:
- A. check the fuel level
 - B. make sure that no one is standing near the wheels or PTO
 - C. check the tire pressure
 - D. check headlights and flashers for proper operation
40. Diesel tractor engines require a heavy duty battery because:
- A. diesel engines are designed to operate in cold weather
 - B. diesel engines don't have alternators
 - C. diesel engines have heavy duty alternators
 - D. diesel engines have a higher compression ratio and require a heavy duty starter
41. One of the main safety hazards in operating a rotary tiller is
- A. dull blades
 - B. slow operating speed
 - C. rocks or other foreign objects
 - D. low tire pressure

42. Why are cool season grasses grown in a warm climate such as Florida?
- A. Cool season grasses actually grow best in hot weather
 - B. Cool season grasses grow well without fertilizer
 - C. Cool season grasses can be top seeded over warm season grasses for green turf in the winter
 - D. Most cool season grasses are pest resistant
43. It is recommended to plant annual ryegrass at a rate of 9 lbs. per 1000 sq. ft.. How many pounds are needed to plant one acre?
- A. 81 lbs.
 - B. 110 lbs.
 - C. 178 lbs.
 - D. 392 lbs.
44. Which would be the best sequence to follow when spreading grass seed with a hand seeder?
- A. Set the seeder one-half open and spread seed until entire area is covered
 - B. Set the seeder one-fourth open and cover the area twice if necessary
 - C. Set the seeder one-half open and fill with one-quarter of the seed, cover one-quarter of the area and adjust the opening accordingly
 - D. Open the seeder all the way and move quickly over the area spreading the seed
45. The three large numbers on a fertilizer bag indicate, in order:
- A. the pounds of Nitrogen, Potassium and Phosphorus
 - B. the pounds of active ingredient in the fertilizer
 - C. the percentage of Nitrogen, Phosphorus and Potassium
 - D. the percentage of Nitrogen, Calcium and Potassium
46. What is the best thing to do if a large amount of fertilizer is spilled on a lawn?
- A. Pick up as much as possible and flush with a large amount of water
 - B. Pick up as much as possible and keep the area dry
 - C. Rake the fertilizer out over a wide area
 - D. Cover the spilled fertilizer with several pounds of lime
47. The biggest disadvantage of using wettable powders in a hand sprayer is:
- A. no agitation
 - B. it can only hold a small amount of pesticide
 - C. it has to be pumped by hand
 - D. it is hard to clean and store
48. The biggest advantage of a hand pesticide sprayer is:
- A. the same sprayer can use a wide variety of insecticides and herbicides
 - B. it is inexpensive and good for large jobs
 - C. it is easy to clean and store
 - D. it uses a more dilute concentration of pesticide
49. Proper pest control involves using:
- A. a combination of chemical and non-chemical controls to limit pest damage
 - B. a combination of chemical and non-chemical controls to eradicate pests
 - C. the latest chemicals on the market
 - D. only a small amount of restricted pesticides

50. It is best to choose an insecticide that will cause the least damage to:
- A. target organisms
 - B. bees
 - C. the tractor
 - D. non-crop weeds
51. A sprayer is calibrated to apply 10 GPA at 15 PSI. To increase the output to 20 GPA without changing speed or nozzle size would require pressure:
- A. 4 PSI
 - B. 120 PSI
 - C. 30 PSI
 - D. 60 PSI
52. A sprayer with a 200 gallon tank is calibrated to apply 10 GPA. Instructions call for a 2 lb/A active ingredient of a pesticide in a 4 lb/gal EC formulation. How many gallons of the pesticide product should be added to the tank?
- A. 5 gallons
 - B. 10 gallons
 - C. 40 gallons
 - D. 80 gallons
53. For the purpose of calibrating a sprayer:
- A. the sprayer should be filled with the correct pesticide solution
 - B. the sprayer should be filled with water
 - C. the sprayer should be empty
 - D. the sprayer should be filled with water and half of the recommended pesticide
54. What should be done when sprayer nozzles clog in the field?
- A. Stop immediately and correct the problem
 - B. Continue spraying to the end of the field, then stop and correct the problem
 - C. Continue spraying until the tank is empty, then stop and correct the problem
 - D. Stop spraying and move to an untreated area to correct the problem
55. Which of the following is a non-chemical pest control method?
- A. repellent
 - B. plant growth regulator
 - C. quarantine
 - D. defoliant
56. A tractor mounted sprayer should not be operated in strong winds because:
- A. the pesticide could blow off target
 - B. the nozzles will clog
 - C. the tractor will use too much fuel
 - D. the pesticide will dry too quickly
57. Which of the following pesticide label signal words means the pesticide is extremely hazardous?
- A. Caution
 - B. Warning
 - C. Danger
 - D. Keep out of reach of children

58. When finished with a spray rig, the most important thing to do is:
- A. park the rig under a shelter
 - B. wash pesticide residues from sprayer system and tank
 - C. fill tank and leave to soak
 - D. lubricate the sprayer
59. The biggest problem one is likely to encounter when operating a power rake or power blower is:
- A. large sticks and debris
 - B. sand and dust
 - C. wet leaves
 - D. windy conditions
60. The biggest problem one is likely to encounter when removing leaves or debris with a power vacuum is:
- A. sticks or other objects too large for the vacuum
 - B. wet leaves
 - C. paper and other litter
 - D. sidewalks and driveways
61. Equipment requiring a 540 RPM power-take-off will use a shaft with how many splines?
- A. 4
 - B. 6
 - C. 12
 - D. 21
62. Before starting a reel-type mower, always check the:
- A. oil, fuel level and hydraulic fluid
 - B. cutting height and blade adjustment
 - C. tire air pressure
 - D. blade sharpness
63. When adjusting the bed-knife to the reel on a reel-type mower one should adjust until:
- A. the blade will cut a piece of newspaper evenly
 - B. it is good and tight
 - C. the blade will turn easily
 - D. the blade cannot be turned by hand
64. If a riding mower does not turn over when you turn the ignition, which of the following is the most likely cause?
- A. Mower is out of fuel
 - B. Broken starter
 - C. Dead battery or poor terminal connections
 - D. Alternator is not functioning
65. A mower will not start when the cord is pulled. Which is the most likely cause?
- A. The mower blade is dull and needs sharpening
 - B. The engine oil level is below normal
 - C. The mower blade is set too low
 - D. The points are frozen together

66. Most small rotary mower engines require:
- A. unleaded fuel
 - B. premium or high test gasoline
 - C. regular gasoline
 - D. regular gasoline with mixing oil added
67. Most power scythes (weed trimmers) are powered by:
- A. small 4 cycle engines
 - B. small 2 cycles engines
 - C. large 4 cycle engines
 - D. large 2 cycle engines
68. Most power scythes (weed trimmers) operate best when the line cord is about how long?
- A. 2 inches
 - B. 4 inches
 - C. 6 inches
 - D. 8 inches
69. Before operating a front end loader the main items to be checked should be:
- A. hydraulic fluid and counter weights
 - B. tire pressure and condition
 - C. water level
 - D. condition of bucket
70. When leaves and grass are removed from an area it is a good idea to make a compost pile because:
- A. the garbage truck only comes once a week
 - B. compost can be useful on flower beds and gardens
 - C. most areas do not allow burning
 - D. most landfills will not accept this type of refuse
71. It is best to use wood treated with preservatives for constructing an arbor because it:
- A. is cheaper
 - B. will resist rot
 - C. will help control weeds
 - D. will be easier to construct
72. Pesticide containers should be triple rinsed to:
- A. prepare the containers for disposal
 - B. save money by making use of the last bit of pesticide
 - C. make it possible to reuse the container
 - D. make it possible to store other chemicals in the container
73. What should arbor posts be set on to prevent rotting?
- A. Post brackets, set in concrete piers
 - B. Gravel
 - C. Concrete
 - D. Soil, with 2 by 4 cleats for bracing

74. Large pesticide containers that will not burn and are in good shape can be :
A. used to store other materials
B. taken to an aluminum recycling center
C. reused by the supplier
D. all of the above
75. Before a pesticide container is crushed for disposal it should be:
A. drained properly
B. rinsed once
C. rinsed two times
D. rinsed three times
76. For proper safety, what should be worn when feeding prunings into a chipper?
A. A hard hat
B. Protective clothing
C. A face shield
D. All of the above
77. The engines used on most small groundskeeping equipment are:
A. air cooled
B. liquid cooled
C. diesel powered
D. all of the above
78. Fence post footings can be crowned about two inches above ground level at the post for:
A. stability
B. water drainage
C. appearance
D. weed control
79. The top of the terminal posts on a chain link fence should be extended how high above the fabric?
A. 1 inch
B. 2 inches
C. 3 inches
D. 4 inches
80. Which of these is best for constructing a straight fence on flat land, in lengths of ten rods or less?
A. 1-span end construction
B. 2-span end construction
C. Brace-line post assembly
D. 1-span end construction braced-line-post assembly
81. Playground sods established vegetatively can be treated for compaction by using a/an:
A. power rake
B. tiller
C. aerator
D. verticutter

82. What should be used to loosen compacted soil when the sod is to be renovated and reseeded?
- A. Aerator
 - B. Verticutter
 - C. Power rake
 - D. Tiller
83. For proper safety while operating on roadways, slow moving vehicles can display:
- A. a slow moving vehicle emblem
 - B. a red or amber flashing light
 - C. a red or orange flag
 - D. all of the above
84. Side sweeper brooms on an industrial sweeper are set to contact the floor at an angle of:
- A. 3 degrees
 - B. 10 degrees
 - C. 30 degrees
 - D. 90 degrees
85. To repair a pothole on an asphalt street, a layer of ready-mix concrete should first be poured to within how many inches of the street surface before the asphalt is added?
- A. 1/2 inch
 - B. 1 inch
 - C. 2 inches
 - D. 6 inches
86. What should be used to smooth small concrete surfaces?
- A. Bull float
 - B. Straight edge
 - C. Darby
 - D. Rake
87. Which of these produces the desired surface for concrete driveways?
- A. Trowel
 - B. Rough wood
 - C. Exposed aggregate
 - D. Broom
88. Mortar mix joints can be dressed and finished while:
- A. wet
 - B. dry
 - C. partially cured
 - D. all of the above
89. While preparing mortar mix the ingredients should initially be mixed:
- A. dry
 - B. after water is added
 - C. as water is added
 - D. by adding each ingredient separately

90. Field stones and river stones make large joints and voids when used in stonework. Approximately what proportion of the structure will be mortar mix when these materials are used?
- A. 1/4
 - B. 1/3
 - C. 1/2
 - D. 2/3
91. Concrete footing for a three foot wall should be:
- A. 4 to 8 inches thick
 - B. 6 to 8 inches thick
 - C. 10 to 12 inches thick
 - D. 14 to 16 inches thick
92. A high quality paint brush allows paint to be applied with less effort because it:
- A. has longer bristles
 - B. has shorter bristles
 - C. holds less paint
 - D. holds more paint
93. A brush used to apply oil base paint can be cleaned with:
- A. soap and water
 - B. alcohol
 - C. turpentine
 - D. all of the above
94. Which type(s) of transmission(s) are used in groundskeeping equipment?
- A. Manual shift
 - B. Power shift
 - C. Hydrostatic
 - D. All of the above
95. Ditch banks should be graded to:
- A. their original shape
 - B. a 20 degree slope
 - C. a 30 degree slope
 - D. a 40 degree slope
96. When sharpening tools the flat side should never be:
- A. ground too fast
 - B. cooled in water
 - C. filed or ground
 - D. left unsharpened
97. The chemical most commonly used to clean pools is:
- A. tannic acid
 - B. sulfuric acid
 - C. nitric acid
 - D. hydrochloric acid
98. Maintaining proper pH in a pool is essential to:
- A. maximize chlorine efficiency
 - B. prevent red or burning eyes
 - C. avoid corrosion and scale deposits
 - D. all of the above

99. In most cases, chlorine should be added to pools most frequently during the:
A. summer
B. fall
C. winter
D. spring
100. What is the largest pipe wrench usually needed for the average plumbing job?
A. 12 inches
B. 18 inches
C. 24 inches
D. 36 inches
101. Which of these can be used in cleaning, repairing and refilling pools?
A. Hydrochloric acid
B. Paint
C. Chlorine
D. All of the above
102. What is the usual horsepower range of gas powered edgers with four cycle engines?
A. 1 to 2
B. 2 to 4
C. 3 to 5
D. 4 to 6
103. Soil lost from a flower bed should be replaced with:
A. sandy loam
B. peatmoss
C. the same type of soil
D. muck
104. The best time to completely remove weeds and grass from flower beds is when the soil is:
A. moist
B. wet
C. dry
D. hard
105. At what depth should annuals be transplanted?
A. One inch higher than they grew in the container
B. The same depth at which they grew in the container
C. One inch lower than they grew in the container
D. 25% lower than they grew in the container
106. Annuals are plants that complete their life cycle in:
A. 1 year
B. 2 years
C. 3 years
D. 4 years
107. At what distance should bulbs generally be spaced?
A. 1 inch
B. 2 inches
C. The same distance as their planting depth
D. Six times the distance of their planting depth

108. After bulbs have been planted one should:
- A. allow the soil to dry thoroughly
 - B. water lightly
 - C. water the soil thoroughly
 - D. pour on liquid fertilizer
109. In which position should bulbs be planted?
- A. With the bud pointed down
 - B. With the bud pointed up
 - C. Horizontally
 - D. Bulbs can be planted in any position
110. Before mulch is added to a flower bed the soil should be:
- A. cultivated
 - B. freed of weeds
 - C. smoothed
 - D. all of the above
111. Which is the main reason for using mulch around new seedlings?
- A. Control insects
 - B. Provide micronutrients
 - C. Control weeds
 - D. Control soil-born diseases
112. Which soil type will hold moisture most efficiently?
- A. Clay loam
 - B. Sand
 - C. Sandy loam
 - D. Silt
113. Potted plants should be watered:
- A. at the first sign of wilting
 - B. after they have wilted
 - C. prior to wilting
 - D. weekly
114. Which of these influences the amount of water needed by plants?
- A. Soil type
 - B. Temperature and humidity
 - C. Wind speed
 - D. All of the above
115. At what angle should branches be pruned in order to promote healing?
- A. 45 degrees
 - B. 65 degrees
 - C. 70 degrees
 - D. 90 degrees
116. Where should the cuts be made when pruning to remove dead wood?
- A. 1 to 2 inches above the live wood
 - B. 1 to 2 inches below the dead wood
 - C. 3 to 4 inches below the dead wood
 - D. Right at the point where the dead wood and live wood meet

117. Which is the best tool for pruning small branches from shrubs?
- A. Pruning saw
 - B. Pruning shears
 - C. Lopping shears
 - D. Hedge shears
118. How high above the bud should cuts be made when pruning to shape shrubs by modifying their growth habit?
- A. 1/8 inch
 - B. 1/4 inch
 - C. 3/8 inch
 - D. 1/2 inch
119. Pruning shrubs to obtain a special shape is called:
- A. espalier
 - B. heading back
 - C. thinning
 - D. topiary
120. How much of a "collar" should be left when an entire branch is pruned from a tree or shrub?
- A. Slight collar (less than 1 inch)
 - B. Two inches
 - C. Three inches or more
 - D. No collar - cut the branch flush with the main stem
121. What is the primary reason for keeping pruning shears sharp?
- A. Slow healing of cuts
 - B. Cutting wire
 - C. Fast healing of cuts
 - D. Personal safety
122. Which tool should not be used to sharpen cutting blades with serrated edges?
- A. File
 - B. Grinder
 - C. Stone
 - D. Steel
123. Which label warning identifies flammable chemicals?
- A. "Keep out of reach of children"
 - B. "Keep away from heat and open flame"
 - C. "Danger" with skull and crossbones
 - D. "Keep stored in original container"
124. What do the "signal words" on a pesticide label tell the applicator?
- A. Rate at which the chemical should be applied
 - B. Toxicity of the chemical
 - C. Formulation of the chemical
 - D. Amount of active ingredient in the formulation
125. What should be done to avoid using outdated and ineffective pesticides?
- A. Dispose of unused chemicals every 6 months
 - B. Dispose of unused chemicals yearly
 - C. Keep an up-to-date inventory on pesticides
 - D. Mix old materials with new when filling the spreader

126. Tiny white to yellow specks on the upper surface of leaves suggest the presence of:
- A. scale insects
 - B. mites
 - C. aphids
 - D. rust
127. Which of these insects will leave chewed, hollowed out areas on plant leaves?
- A. White flies
 - B. Scale insects
 - C. Stink bugs
 - D. Caterpillars
128. Which of these insects are honeydew producers?
- A. Scales, whitefly and mealybugs
 - B. Grasshoppers and crickets
 - C. Snails and slugs
 - D. Beetles and weevils
129. The presence of sooty mold on plants usually indicates that the plant is under attack by:
- A. chewing insects
 - B. boring insects
 - C. sucking insects
 - D. spider mites
130. Which type of product would be used to treat plants suffering from a bacterial disease?
- A. Herbicide
 - B. Avicide
 - C. Antibiotic
 - D. Fungicide
131. Which is the best way to control plant diseases in ornamental plants?
- A. Fumigate the soil when diseases become visible on plants
 - B. Spray pesticides on plants during hours of bright sunlight
 - C. Use pesticides to cure the plant tissue that is infected with disease
 - D. Use pesticide to prevent the spread of infection
132. Which of these is a chewing insect?
- A. Spider mite
 - B. Aphid
 - C. Japanese beetle
 - D. Mealy bug
133. Which of these would be the appropriate type of pesticide to kill weeds in an established lawn?
- A. Non-selective
 - B. Soil fumigant
 - C. Preemergence
 - D. None of the above

134. If a label describes a herbicide as having systemic action for control of broadleaf plants, this chemical will probably not harm:
- A. ground covers
 - B. turf grasses
 - C. shrubs and trees
 - D. any of the above
135. What are the characteristics of biennial weeds?
- A. Narrow leaves and triangular stems
 - B. Germinate in the spring, grow through the summer, flower and die in the fall
 - C. Germinate in the fall, grow through the winter, flower and die in the summer
 - D. Produce a rosette of leaves in the first year, produce seed and die in the second year
136. Which of these is part of the proper procedure for transplanting a small, burlapped tree?
- A. Set tree at the same depth as the previous location
 - B. Burlap must be removed from root ball before planting
 - C. Prune off about 1/3 of the tree top
 - D. All of the above
137. Which of these is part of the proper procedure for transplanting a bareroot tree?
- A. Spread out the tree's roots
 - B. Fill the hole thoroughly, leaving no air pockets
 - C. Stake the tree
 - D. All of the above
138. Which is the proper way to brace a newly planted tree with a diameter of 2 inches or less?
- A. Use a light material such as string to tie the trunk to the stake
 - B. Set the stake three feet away from the trunk
 - C. Drive the stake 12 inches into the ground so that it will resist strong winds
 - D. Place the stake immediately next to the trunk, but not touching, and tie them together
139. To produce an espalier, plants are trained to:
- A. adopt a round or spherical shape
 - B. grow flat against a wall
 - C. adopt a more natural shape
 - D. become dwarf
140. Which of these is part of the proper procedure for building support structures for training vines?
- A. Use durable materials for long lasting support
 - B. Do not use wire to support the vines
 - C. Use materials that will corrode or rot away once vines are established
 - D. Install the structure in shady areas only

141. What is the best thing to do when a tree has a cavity with diseased and decayed wood inside it?
- A. Remove all diseased and decayed wood with a chisel and hammer
 - B. Wait until decay has stopped before using a chisel to remove dead wood
 - C. Apply tree paint over entire damaged area
 - D. Avoid using a chisel as this can cause spread of disease
142. Which of these is part of the proper procedure for bracing a V-crotch using cables?
- A. Install cable loosely to allow branches to bend
 - B. Tighten cable until branches bend
 - C. Install cable and eye bolts forming a straight line
 - D. Install cable and eye bolt forming a 45 degree angle
143. A stump router is a machine that will:
- A. cut a stump into wood chips
 - B. burn the stump out of the ground
 - C. pull the stump out of the ground
 - D. dissolve the stump with acid
144. Which of these is part of the correct procedure for removing a stump from a lawn?
- A. Pull chain up with a jack placed on timbers alongside the stump
 - B. Remove stump by pulling the chain with a truck going 10 MPH
 - C. Dig the stump out with a pickaxe
 - D. Burn the stump out of the ground
145. For a tree to be killed by girdling, the ring cut around the trunk should be deep enough to penetrate:
- A. the bark
 - B. the bark and cambium
 - C. the bark, cambium and xylem
 - D. all layers down to the heartwood
146. A shading device for protecting new plants in a landscape should:
- A. not touch the plant foliage
 - B. block all sunlight
 - C. be strong enough for permanent use
 - D. be airtight
147. Which of the following is correct when wrapping trees and shrubs to protect them from the weather?
- A. Avoid using burlap as a wrapping material
 - B. Apply wrapping material in a spiral fashion around the trunk, then wrap string in the opposite direction
 - C. Wrap trunk with black rubber from inner tubes, and hold in place with wire
 - D. Strip most of the bark off the trunk before wrapping
148. What material should be used to fill holes or depressions in a lawn?
- A. Sand
 - B. Humus
 - C. Top soil
 - D. Peat

149. To prepare a lawn for reseeding, holes and depressions should be filled to:
- A. a point above level when packed
 - B. match the contour of the area when packed
 - C. slightly below the level of the surrounding area
 - D. the level of the highest point on the lawn
150. What should be the first step in repairing bare and worn spots on an established lawn?
- A. Fertilize
 - B. Water the area thoroughly
 - C. Prepare the soil
 - D. Lay the sod
151. In which direction should rolling be done in relation to the way the sod lengths were layed?
- A. Parallel
 - B. Perpendicular
 - C. Reverse
 - D. At a 45 degree angle
152. Compost is usually prepared in a bin by stacking alternating layers of:
- A. inorganic material
 - B. food scraps
 - C. newspapers and other waste paper
 - D. organic materials
153. When organic material is stacked in layers for decomposition the material produced is called:
- A. leaf mold
 - B. silage
 - C. compost
 - D. lunch
154. What is the primary benefit of applying compost to garden soil?
- A. Raises the pH
 - B. Lowers the pH
 - C. Improves soil texture and water holding capacity
 - D. Supplies large amounts of available Nitrogen and Phosphorus
155. Compost added to a soil can benefit plants by:
- A. repelling insects and nematodes
 - B. keeping air out of the soil
 - C. holding air in the soil
 - D. causing the soil to pack tightly
156. Which is the best way to spread compost in a garden?
- A. Spread the compost evenly over the soil surface
 - B. Mix the compost uniformly throughout the soil
 - C. Spread the compost evenly around the edge of the garden
 - D. Lay the compost only in the rows

157. What should be added to soil being prepared for lawn planting, if the pH is found to be 8.0?
- A. Sulfur
 - B. Dolomite
 - C. Compost
 - D. All of the above
158. How deep should a seedbed be tilled before planting a new lawn?
- A. 2 inches
 - B. 6 inches
 - C. 1 foot
 - D. Lawn seedbed does not need to be tilled before planting
159. Once a lawn seedbed is prepared, fertilizer should be spread over the area and:
- A. left on the soil surface
 - B. tilled into the soil
 - C. watered heavily to leach it into the soil
 - D. a roller should be used to pack the fertilizer on the surface
160. What must be added to convert subsoil into topsoil?
- A. Lime
 - B. Organic matter
 - C. Clay
 - D. Sand
161. Adding fertilizer, organic matter and lime combined with proper tillage and leveling can convert subsoil into:
- A. compost
 - B. humus
 - C. loam
 - D. topsoil
162. Marked stakes should be driven into an area where topsoil is to be spread in order to:
- A. speed up the job
 - B. assure proper depth
 - C. mark the rows
 - D. calculate the amount of soil needed
163. What do the words "highly toxic" on a soil fumigant label indicate?
- A. The chemical is poisonous to humans
 - B. The chemical will break down quickly
 - C. The chemical needs water to be activated
 - D. The chemical can be used to kill all kinds of pests
164. Which type(s) of crop pests can be controlled by soil fumigants?
- A. Weeds
 - B. Soil born diseases
 - C. Nematodes
 - D. All of the above
165. What does it mean if a chemical can be used to sterilize soil?
- A. The chemical will kill everything except crop plants
 - B. Nothing will grow in the soil again
 - C. The chemical will kill all organisms in the soil
 - D. The chemical will kill bacteria only

166. What type of pests do herbicides control?
- A. Weeds
 - B. Insects
 - C. Diseases
 - D. Nematodes
167. What does it mean to aerate a lawn?
- A. Air is forced out of the lawn by using heavy rollers
 - B. The grass is mowed to a very short length to allow air to penetrate
 - C. Holes are made in the sod to allow air to enter
 - D. Compressed air is pumped under the sod
168. What is the purpose of using an implement designed to punch spike holes 4 inches deep into sod?
- A. Aerating the sod
 - B. Control of nematodes
 - C. Preparing for fertilization
 - D. Removing thatch from the lawn
169. Which is the best method of fertilizing newly planted trees using the punch bar method?
- A. Space holes 24 inches apart in a circle 4 feet from the trunk of the tree
 - B. Space holes 24 inches apart in a circle at the dripline of the tree
 - C. Space holes 10 inches apart in a circle at the dripline of the tree
 - D. Space holes 10 inches apart right next to the tree's trunk
170. What is the fertilization method called, where holes are pounded into the ground around the tree and fertilizer poured into the holes?
- A. The punch bar method
 - B. The post hole method
 - C. The hole punch method
 - D. The deep feeder method
171. How can soil erosion caused by water be controlled?
- A. Plant cover crops
 - B. Construct terraces
 - C. Plant on the contour
 - D. All of the above
172. The angle at which an edge is sharpened is called the:
- A. bevel
 - B. grinding plane
 - C. degree of sharpness
 - D. stone degree
173. Broken handles should not be removed from tools by burning because:
- A. they can usually be repaired quite easily
 - B. most handles are made of fire resistant wood
 - C. heat can weaken the metal portion of the tool
 - D. toxic fumes may be given off by the wood
174. Heavy duty extension cords are those that have:
- A. one wire
 - B. two wires
 - C. three wires
 - D. four wires

175. What is the most important thing to remember when sharpening a lawn mower blade on a grinding wheel?
- A. Keep the blade cool
 - B. Observe safety precautions
 - C. Run the grinder at the proper speed
 - D. Sharpen the blade slowly
176. Which way should the cutting edge of a replacement brush blade be pointed on a power scythe (weed trimmer)?
- A. Clockwise
 - B. Counterclockwise
 - C. Up
 - D. Down
177. What should be done after a fertilizer spreader has been washed and allowed to dry?
- A. Put the spreader in storage
 - B. Oil the spreader to prevent rust
 - C. Fill with fertilizer before storing
 - D. None of the above
178. How should it be determined what parts to lubricate on a power vacuum?
- A. Salesman's instructions
 - B. Lubricate all moving parts
 - C. Lubricate any parts that squeak
 - D. Follow directions in operator's manual
179. Daily lubrication of a tractor (every 10 hours of use):
- A. reduces wear on the tractor
 - B. protects the tractor's bearings
 - C. makes the tractor easier to operate
 - D. all of the above
180. Sealed tractor bearings should be lubricated carefully because:
- A. too much pressure can damage the seal
 - B. grease fittings will not accept grease under too high pressure
 - C. too much pressure causes the bearing to work poorly
 - D. none of the above
181. What kind of problem(s) can result from overfilling a small engine's crankcase with oil?
- A. Increased oil consumption
 - B. Oil foaming
 - C. Blown seals
 - D. All of the above
182. Before changing the oil in a tractor engine:
- A. the engine should be completely cooled down
 - B. the spark plugs should be removed
 - C. the engine should be thoroughly warm
 - D. none of the above

183. After the oil has been changed in a four cycle engine it is best to start the engine and:
- A. fill the fuel tank
 - B. check the drain plug and oil filter for leaks
 - C. adjust the carburetor
 - D. add another quart of oil with the engine running
184. Tractor tire pressure should be checked with a low pressure gauge with one pound markings because:
- A. tractor tires always have water in them
 - B. tractor tires have a special air valve that cannot be checked by a standard tire gauge
 - C. tractor tires are usually inflated to a low pressure
 - D. all of the above
185. It is best to check the pressure in a tractor tire when the tire is:
- A. cold
 - B. warm
 - C. taken off the tractor
 - D. jacked up off the ground
186. Which is the best way to keep dirt and debris out of an engine before replacing the spark plugs?
- A. Wash the engine with soap and water after removing the plugs
 - B. Remove the plugs very carefully
 - C. Use an air nozzle to blow dirt away from the plugs
 - D. All of the above
187. What is the sequence that should be followed for these steps in replacing a radiator hose? 1-Remove old hose 2-refill radiator with coolant 3-Install new radiator hose 4-Clean radiator neck.
- A. 1-2-4-3
 - B. 1-3-4-2
 - C. 2-1-4-3
 - D. 1-4-3-2
188. As a safety precaution, what should be done whenever work is to be done on a small engine?
- A. Drain the fuel tank
 - B. Disconnect the spark plug wire
 - C. Disconnect the carburetor
 - D. All of the above
189. Which type of air cleaner removes dust and debris as the air circulates the porous surface of paper or fiber elements?
- A. Oil bath
 - B. Oiled filter
 - C. Dry filter
 - D. None of the above
190. How can the idle speed of a small engine be changed?
- A. Stretching the governor spring
 - B. Turning the idle screw
 - C. Bending the link that holds the governor spring
 - D. All of the above

191. What is the correct sequence for the following steps in servicing chain drives on groundskeeping equipment? 1-Remove connector link and chain 2-Replace chain and connector link 3-lubricate chain 4-clean chain in solvent.
- A. 3-1-4-2
 - B. 1-4-3-2
 - C. 4-3-1-2
 - D. 1-4-2-3
192. Open gears on groundskeeping equipment can be lubricated by means of:
- A. a splash pan in which the gears run
 - B. hand lubrication, by brushing or squirting
 - C. use of a drip oiler
 - D. all of the above
193. The final step before painting a piece of equipment should be to:
- A. Clean off any dirt, rust and old paint
 - B. Straighten dents
 - C. Sand rough areas
 - D. Prime bare areas

Form II

1. Which of these tasks is likely to be a responsibility of a groundskeeper?
 - A. Landscape design
 - B. Propagating nursery stock
 - C. Replacing dead and diseased plants
 - D. Foliage production
2. What should be done prior to adding soil amendments to improve the soil?
 - A. Till the soil
 - B. Add mulch
 - C. Add lime
 - D. Perform a soil test
3. An effective daytime security plan for a grounds area should include:
 - A. personal identification
 - B. structured restraints
 - C. gate or door checks
 - D. all of the above
4. Which of these is a commonly used fungicide?
 - A. Diazinon
 - B. Captan
 - C. Malathion
 - D. Kelthane
5. One way to discourage fungal disease from attacking plants is to:
 - A. water during the night
 - B. keep plants moist with a steady mist
 - C. keep upper portion of plant dry between waterings
 - D. spray the leaves with water regularly
6. What is the recommended mowing height for St. Augustine or Bahia grass?
 - A. 3/4 to 1 inch
 - B. 2 inches to 3 inches
 - C. 1.5 inches to 2 inches
 - D. 3 inches to 4 inches
7. For what reason is lime added to soil?
 - A. Make the soil more basic
 - B. Make the soil more acidic
 - C. Lower the pH
 - D. Add Nitrogen
8. Soil drainage may be improved by adding:
 - A. organic matter
 - B. clay
 - C. plastic mulch
 - D. lime

9. Which of these is used to control some caterpillars?
 - A. Captan
 - B. *Bacillus thuringiensis*
 - C. Benlate
 - D. Vapam
10. One should read the label before spraying insecticide on plants to avoid:
 - A. phytotoxic response
 - B. systemic response
 - C. evapo-transpiration
 - D. water absorption
11. Which of these factors should be considered when inspecting landscape plants before purchase?
 - A. Landscape specifications
 - B. Acclimatization
 - C. Damage or disease
 - D. All of the above
12. Personnel policy rules should be:
 - A. posted on the bulletin board
 - B. distributed to all staff members
 - C. distributed to new staff members
 - D. reviewed at every staff meeting
13. The main reason for developing alternative methods for performing groundskeeping tasks is to:
 - A. offer variety for the worker
 - B. utilize equipment in different ways
 - C. provide incentive for employees
 - D. find more cost effective methods
14. The most effective way to present safety precautions for machine operation is:
 - A. posted rules in machine storage area
 - B. oral instructions given to operator
 - C. assigned reading of operators manual
 - D. audio-visual short course on machine safety
15. Which is the best way for a supervisor to approach an employee regarding excessive absenteeism?
 - A. Address the problem at a staff meeting
 - B. Call the employee in for a conference
 - C. Ask the employee to read the job manual
 - D. Fire the employee
16. Which of these would be the best criteria for determining whether an applicant is qualified for a job?
 - A. Applicant's reason for seeking job
 - B. Neatness and general appearance of applicant
 - C. Applicant's interest in job
 - D. Comparison of job description with applicant's qualifications

17. What should be the main criteria in determining an employee's eligibility for promotion?
 - A. Seniority
 - B. Attitude
 - C. Ability to get along
 - D. Good work evaluations
18. Which would be the best procedure to follow if an employee reports that another worker is intoxicated on the job?
 - A. Fire the accused employee
 - B. Reprimand the accused employee and send him back to work
 - C. Determine if the accusation is correct and hold a private conference with accused worker
 - D. Review company policy manual with the employee
19. Which of these should be the primary purpose for holding a staff meeting?
 - A. Discuss safety procedures
 - B. Discuss work to be completed and scheduling
 - C. Test the staff's knowledge of the job
 - D. Address individual staff member's problems
20. How often should inventory be taken and items reordered?
 - A. Once a week
 - B. Once a month
 - C. Every 6 months
 - D. Once a year
21. Which of these soil amendments would help the soil retain moisture?
 - A. Lime
 - B. Perlite
 - C. Peat
 - D. Urea
22. How much sunlight will reach plants being protected by a 30% shade cloth?
 - A. 10%
 - B. 70%
 - C. 30%
 - D. 100%
23. When employees order supplies they should first:
 - A. Submit a purchase order to supervisor
 - B. Call in the purchase
 - C. Mail the invoice
 - D. All of the above
24. Accurate employee work records are kept by recording information from:
 - A. time cards
 - B. monthly progress reports
 - C. job completion reports
 - D. supervisor evaluation reports
25. What should be done with employee evaluation forms once they have been completed?
 - A. They should be filed in the employees permanent record
 - B. They should be reviewed at a private conference with the employee
 - C. They should be reviewed at a staff meeting
 - D. They should be posted on a bulletin board

26. After reviewing an accident report, a supervisor should:
- A. call an attorney
 - B. discuss the accident with the employees involved
 - C. file all reports with an insurance company
 - D. fire the employees responsible for the accident
27. Which would be the best way to analyze the work loads of several employees?
- A. Determine the worker who completes his task in the least amount of time?
 - B. List each duty, time spent, difficulty and amount of help needed
 - C. Determine the amount of time each worker wastes
 - D. List each worker and see how well they perform each task
28. The best procedure to follow in evaluating a mower for purchase would be to:
- A. inspect the mower, check the service record and take a short test run
 - B. look the mower over and take it for a test run
 - C. question the salesperson about the mower
 - D. check the mower for cleanliness and obvious defects
29. Which of these would be the best way to take soil samples from a 400 square foot field?
- A. Take three random samples, put them in a mailer and send them to the county agent
 - B. Take at least 50 samples at random, mix together to prepare one 4 ounce sample
 - C. Take about 20 samples approximately 50 feet apart, including topsoil and subsoil, mix together to prepare one 4 ounce sample
 - D. Take about 20 samples approximately 50 feet apart, topsoil only, mix together and prepare one 4 ounce sample
30. Lime is added to many Florida soils to:
- A. lower the pH
 - B. increase soil tilth
 - C. raise the pH
 - D. improve the texture of sandy soils
31. Before starting a tractor, always check which of the following?
- A. Air pressure in tires
 - B. Oil level in crankcase and coolant level
 - C. Oil level in the oil bath air filter
 - D. Oil level in the transmission
32. If the radiator on a pickup truck develops a leak while on the road one should:
- A. remove the radiator cap, add water and replace cap
 - B. remove the radiator cap, add water, leave the cap off and add water as needed
 - C. drive back to base at a slow speed
 - D. call or walk for help
33. Which of the following is the most important task before operating a truck?
- A. Check the fuel level
 - B. Check the oil and water
 - C. Check the tire pressure and spare tire
 - D. Check the windshield wipers and wiper fluid

34. If a tractor engine fails to turn over what is the first thing that should be done?
- A. Use another tractor to pull start it
 - B. Use another tractor to jump start it
 - C. Check the battery connections and fluid level
 - D. Install a new battery
35. Most tractor accidents are caused by:
- A. low tire pressure
 - B. excessive speed
 - C. fatigue
 - D. failure to display SMV sign
36. The main reason for filling a tractors fuel tank at the end of the day is:
- A. to save time the next day
 - B. in case fuel prices increase overnight
 - C. to prevent condensation inside the fuel tank
 - D. so that trash can settle out overnight
37. Rotary tillers are sometimes dangerous because:
- A. they all have front blades
 - B. most are self-propelled
 - C. they have larger engines than lawn mowers
 - D. they use different fuel than lawn mowers
38. What is the best way to establish hybrid Bermuda grass?
- A. Sow seed in the summer
 - B. By sprig or sod
 - C. Mix the seed with seed of other varieties
 - D. Sow seed during the winter
39. The most important things to remember when operating a tractor pulled lawn roller are:
- A. avoid stopping and sharp turns
 - B. travel as fast as possible with as much weight as possible
 - C. travel as slowly as possible with as much weight as possible
 - D. cover the area several times and wet if necessary
40. The best way to increase the amount of fertilizer applied with a centrifugal spreader is to:
- A. speed up and open the gates wider
 - B. slow down and open the gates wider
 - C. speed up and close the gates down
 - D. slow down and close the gates down
41. What is the first thing that should be done after finishing work with a fertilizer spreader?
- A. Put the spreader under a shelter
 - B. Wash the spreader thoroughly and coat metal parts with oil
 - C. Fill the spreader with fertilizer before storing
 - D. Clean the spreader as well as possible without using water
42. The most important thing to do before using any pesticide is to:
- A. choose the correct pesticide for the target pest
 - B. make sure you have the proper equipment
 - C. read the label carefully
 - D. calibrate the sprayer

43. Which of the following pesticide formulations can be successfully applied with a hand sprayer?
- A. Dust
 - B. Wettable powder
 - C. Bait
 - D. Granular
44. A selective herbicide controls:
- A. only weeds
 - B. only certain kinds of plants
 - C. all weeds and crops in a field
 - D. only indeterminate plants
45. To double the amount of pesticide sprayed you must increase the sprayer pressure:
- A. 2 times
 - B. 4 times
 - C. 1 time
 - D. 3 times
46. A sprayer with a 200 gallon tank is calibrated to apply 40 GPA. To apply 2 lbs of active ingredient per acre of a 50% wettable powder, how many lbs of pesticide need to be added to the tank?
- A. 5 lbs
 - B. 10 lbs
 - C. 20 lbs
 - D. 40 lbs
47. A tractor mounted sprayer is calibrated to assure that:
- A. the entire field is covered
 - B. there is enough pesticide to complete the job
 - C. the correct amount of pesticide is applied to the specified area
 - D. all the target organisms are killed
48. One of the requirements for effective pest control is:
- A. identification of the pest to be controlled
 - B. new spray equipment
 - C. using more than the recommended dosage
 - D. spraying only the field margins
49. Which of the following do Dust and Granular pesticide formulations have in common?
- A. Same active ingredients
 - B. Same inert ingredients
 - C. Will not mix with water
 - D. Same particle size
50. By which of these methods can spray application rates be increased?
- A. Increase speed of travel
 - B. Lower spray pressure
 - C. Use a larger output nozzle
 - D. Raise the boom

51. The biggest disadvantage of an electric power edger is that:
- A. the cost is prohibitive
 - B. electric models are not powerful
 - C. electric outlets and cords are too limiting
 - D. they can not be used on wet sidewalks
52. Before operating a power vacuum attached to a tractor PTO, one should always check the following:
- A. fuel level
 - B. tire pressure and weight adjustment
 - C. area where debris is to be dumped
 - D. hook up, safety guards and height adjustment
53. If a power vacuum requires a 21 spline PTO shaft it is designed to be operated at how many RPM?
- A. 380
 - B. 540
 - C. 1000
 - D. 1500
54. The reels on a reel-type mower need to be adjusted to the bed-knives everytime:
- A. you begin to mow
 - B. you move to a new area
 - C. the mower fails to leave a smooth even cut
 - D. you finish for the day
55. The best place to adjust the cutting height of a multiple reel mower is:
- A. on the field where you will be cutting
 - B. on the trailer before unloading
 - C. on the edge of the field to be cut
 - D. on a smooth, level cement floor
56. When operating a reel-type mower one should:
- A. mow at a speed that leaves a neat, smooth cut
 - B. travel at the highest speed possible
 - C. mow in both directions
 - D. cut the grass as close as possible
57. How often should the oil in a rotary mower be changed?
- A. Every 10 hours
 - B. Every 25 hours
 - C. Every 40 hours
 - D. Every 50 hours
58. The advantage of a two cycle gasoline engine over a four cycle gasoline engine is that:
- A. they are easier to start
 - B. they cost less
 - C. they are easier to maintain
 - D. they are lighter and can be operated in various positions
59. Two cycle engines must have oil added to their fuel because:
- A. two cycle engines do not have oil in the crankcase
 - B. the oil makes the gas burn smoother
 - C. two cycle engines have special fuel injectors that must be lubricated
 - D. the oil makes the fuel burn slower

60. Before starting to dig a ditch with a backhoe, one should always check:
- A. tire and hydraulic pressure
 - B. engine RPM
 - C. for any roots or rocks
 - D. for gas lines or electric wires
61. When cleaning a restroom, which should be the order of tasks?
- A. Wet mop, clean fixtures, pick up paper
 - B. Sweep and dust, clean fixtures and wet mop
 - C. Sweep and dust, wet mop, pick up paper
 - D. Wet mop, sweep and dust, clean fixtures
62. The proper way to dispose of pesticide containers is to:
- A. carry them to the nearest landfill site
 - B. crush and burn them
 - C. put them out for pick-up with other trash
 - D. follow disposal directions on container
63. When arbor posts are set in the soil, the depth should be at least:
- A. 2 feet
 - B. 3 feet
 - C. 4 feet
 - D. 5 feet
64. Arbors may be covered with:
- A. woven wire
 - B. lathing
 - C. 2 by 2's
 - D. all of the above
65. Before disposal, diluted pesticides should be collected in:
- A. holding tanks
 - B. empty containers
 - C. garbage cans
 - D. all of the above
66. Which is the best way to dispose of wood chips from a chipper?
- A. Mulching
 - B. Burning
 - C. Hauling to a landfill site
 - D. All of the above
67. The minimum spacing of posts for chain-link fences with top rails is:
- A. 8 feet
 - B. 10 feet
 - C. 12 feet
 - D. 14 feet
68. The proper setting depth for an anchor-and-brace post is at least:
- A. 2 feet tall
 - B. 3.5 feet tall
 - C. 4 feet tall
 - D. 4.5 feet tall

69. Which type of fencing would be recommended for security?
- A. chain link fences
 - B. single strand electric fences
 - C. board fences
 - D. woven wire fences
70. How often should an area reseeded with Bahia grass be watered?
- A. Three times each day even after the grass is established
 - B. Weekly until the grass is established
 - C. Twice each week until the grass is established
 - D. Daily (as often as needed) until the grass is established
71. Before using an industrial sweeping machine in a groundskeeping operation, the operator must be:
- A. sixteen years of age
 - B. trained and qualified in heavy equipment operation
 - C. licensed to drive an automobile
 - D. all of the above
72. Main sweeper brooms on an industrial sweeper should be replaced when the bristles are worn to a length of:
- A. 1 inch
 - B. 2 inches
 - C. 3 inches
 - D. 4 inches
73. When asphalt is poured over concrete to fill a pothole it should be:
- A. compacted and smoothed with a contour slightly higher than the roadway
 - B. compacted and smoothed at the same level as the roadway
 - C. compacted and smoothed with a contour slightly lower than the roadway
 - D. compacted only
74. Forms for supporting concrete 4 inches in thickness should be made from:
- A. 2 by 4's
 - B. 1 by 4's
 - C. 3 by 4's
 - D. 4 by 4's
75. Forms for concrete work are supported by stakes placed every:
- A. 2 feet
 - B. 4 feet
 - C. 6 feet
 - D. 8 feet
76. Mortar mix can be mixed in/on a:
- A. wheel barrow
 - B. wooden box
 - C. square of plywood
 - D. all of the above
77. Which of these are weaknesses of stone as a building material when compared to brickwork?
- A. Stones are heavy
 - B. Plumb lines are different
 - C. stones are not uniform in shape
 - D. all of the above

78. A batter board can be used to determine the slope of a stone wall. For every 2 feet of height the wall should slope:
- A. 1 inch
 - B. 3 inches
 - C. 6 inches
 - D. 12 inches
79. Which of these mortar mixes would be best for fireplace stonework?
- A. 1 part cement, 3 parts sand
 - B. 1 part cement, 2 parts sand, 3 parts gravel
 - C. 1 part cement, 3 parts sand, 1/2 part fire clay
 - D. 1 part cement, 3 parts sand, 1/3 part hydrated lime
80. Which type of paint can be cleaned from brushes with soap and water?
- A. Oil base
 - B. Latex
 - C. Varnish
 - D. Shellac
81. Which type of fuel is most often used in groundskeeping power equipment?
- A. Gasoline
 - B. Diesel
 - C. LP gas
 - D. Alcohol
82. Which of these can result in soil erosion along drainage ditches?
- A. Excessive runoff
 - B. Steep ditch banks
 - C. Poor grass cover on ditch banks
 - D. All of the above
83. Poor drainage can be due to:
- A. excessive runoff
 - B. excessive erosion
 - C. debris in drainage ditch
 - D. all of the above
84. The best pH range for pools is:
- A. 6.8 to 7.2
 - B. 7.2 to 7.6
 - C. 7.6 to 8.0
 - D. 8.0 to 8.4
85. What can be used to prevent joints and threads on irrigation lines from rusting?
- A. Pipe joint compound
 - B. Teflon tape
 - C. Silicone
 - D. All of the above
86. What tool should be used to prevent the marring of square and hexagon-shaped fittings on irrigation lines?
- A. Pipe wrench
 - B. Slip joint pliers
 - C. Vice grip pliers
 - D. Open end wrench

87. Which is the best way to clean a swimming pool?
- A. Clean all surfaces with a Chlorine solution
 - B. Clean all surfaces with acid solution
 - C. Add acid solution to the water after refilling the pool
 - D. Allow the pool to dry for several days before refilling
88. Which is the most common way to remove obstructions from an irrigation system?
- A. Use compressed air in the water lines
 - B. Replace clogged pop-ups
 - C. Clean clogged sprinkler heads with directed water spray
 - D. All of the above
89. Which of these tools can be used to remove grass from flower bed edges?
- A. Hand edger
 - B. Power edger
 - C. Shovel
 - D. All of the above
90. Which is the best method for removing grass from the edge of a flower bed?
- A. Stretch a string to mark the edge and dig or pull all grass inside the string
 - B. Dig up all grass within 6 inches of the edge to allow for regrowth
 - C. Use a general, systemic herbicide over the entire area to kill all the grass
 - D. All of the above
91. How deep should the strokes of a hoe penetrate the soil to remove weeds from a flower bed?
- A. Deep
 - B. Moderately deep
 - C. Moderately shallow
 - D. Shallow
92. Which is best when using a hoe to remove weeds from a flower bed?
- A. If soil is hard, sprinkle with water before hoeing
 - B. Use a hoe only in soil that is completely dry
 - C. Dig to a depth sufficient to remove all weed roots
 - D. After digging, turn weeds over and bury them in the flower bed
93. What is the main effect that weeds have on ornamental plants?
- A. Weeds attract insects, keeping them away from the ornamentals
 - B. Weeds act as a repellent for nematodes
 - C. Weeds detract from the appearance of ornamental plants
 - D. Weeds help to shade the soil and conserve moisture
94. Which of these is part of the proper procedure for planting container grown annuals in a landscape bed?
- A. Hold the plant by the base of the stem and pull it from the container
 - B. Make the planting hole at least twice as deep as the container
 - C. Place the plant at a shallower depth than it was growing in the container
 - D. Install a temporary shade structure over the plants

95. The correct method for planting container grown annuals in a landscape bed is to:
- A. set the plant in the hole with the top of the root ball at least 2 inches below the surface
 - B. dig the planting hole about twice the width of the root ball
 - C. wash the old soil from the roots before planting
 - D. prune the main branches to speed up the plant's establishment
96. As a general rule bulbs should be planted at a depth how many times the bulbs greatest diameter?
- A. Two times
 - B. Three times
 - C. Four times
 - D. Five times
97. What is the correct way to plant bulbs in a prepared bed?
- A. Place the bulbs, uncovered, on the soil surface
 - B. Cut the bulb into several pieces and place each piece on the soil surface
 - C. Plant the bulb with the pointed end downwards
 - D. Plant the bulb with the pointed end upwards
98. What is the reason for planting Caladium bulbs with the pointed end upwards?
- A. The bulb cannot sprout if the pointed end is downwards
 - B. The bulb will die if the pointed end is not upwards
 - C. The plant will not develop a good root system if the pointed end is downwards
 - D. The bulb will sprout sooner if the pointed end is upwards
99. Which is the most important reason for adding mulch around new seedlings?
- A. Mulch helps control weeds
 - B. Mulch keeps the soil drier
 - C. Mulch is a good source of Nitrogen
 - D. All of the above
100. Which of these will reduce moisture loss from the soil?
- A. Drainage ditches
 - B. Tile drains
 - C. Trickle irrigation
 - D. Mulching
101. Which of these soil types will be most subject to erosion on sloping, irrigated land?
- A. Sandy loam
 - B. Clay loam
 - C. Sand
 - D. Silt
102. How do clay and sand compare for irrigation purposes?
- A. Clay requires water more often than sand
 - B. The same amount of water penetrates deeper into clay than sand
 - C. Water is more likely to run off from clay soils
 - D. An area of clay needs less water per irrigation than the same area of sand

103. Which of these is considered a good irrigation practice?
- A. Water is applied every day
 - B. Water is applied as fast as soil will absorb it without runoff
 - C. Soil is maintained moist to a depth of 18 inches
 - D. Water is applied during the hottest part of the day
104. The speed at which water is absorbed by the soil depends on:
- A. the size of the pore spaces
 - B. the size of soil particles
 - C. the manner in which soil particles are arranged
 - D. all of the above
105. Where should the cuts be made when pruning shrubs?
- A. 1/4 inch below buds or branches
 - B. 1/4 inch above buds or branches
 - C. 1/4 inch either above or below buds or branches
 - D. About halfway up individual branches
106. What is the best way to prune a shrub if an open branching shape is desired?
- A. Pinch some branch tips
 - B. Prune some branches, leaving stubs
 - C. Prune some branches to the main branch or trunk
 - D. Prune some branches to a bud
107. When pruning shrubs which of these processes are promoted by thinning?
- A. Better root growth
 - B. Faster growth
 - C. Well balanced growth
 - D. All of the above
108. Which of these is a reason for pruning shrubs?
- A. Remove dead or injured wood
 - B. Remove diseased wood
 - C. Create a special shape
 - D. All of the above
109. When pruning, duplicate branches should be:
- A. removed
 - B. retained for greater plant fullness
 - C. retained for symmetry
 - D. trimmed back to half their length
110. What should generally be removed when pruning shrubs?
- A. Suckers
 - B. Duplicate branches
 - C. Dead or diseased branches
 - D. All of the above
111. Where should cuts be made if the purpose of pruning is to produce the maximum amount of rejuvenation in a shrub?
- A. 1/4 inch above a bud
 - B. In main branches or trunk, close to the ground
 - C. 1/4 inch above a side branch
 - D. 1/2 inch above a main branch

112. When a shrub has dead branches:
- A. these branches will soon fall off
 - B. microorganisms will cause them to decay but will not effect the living portion of the plant
 - C. they should be pruned only if they detract from the appearance of the plant
 - D. they should always be pruned
113. Where should the cut be made, when the purpose of pruning is to produce the greatest amount of new branches?
- A. 1/4 inch below a bud
 - B. 1/4 inch above a bud
 - C. 1/4 inch above a small branch
 - D. 1/4 inch above a main branch
114. "Sucker" is the name given to a branch that develops:
- A. from main branches of a shrub
 - B. when a branch tip is pinched
 - C. from the roots or the trunk base
 - D. when a large branch is cut, leaving a stub
115. Where should the cuts be made when the purpose of pruning is to produce the least amount of regrowth?
- A. At a bud
 - B. On a small side branch
 - C. On a main branch
 - D. Dead branches only
116. The pruning procedure that removes old and unproductive branches is called:
- A. heading back
 - B. renewal pruning
 - C. thinning
 - D. espalier
117. What should be used to dress plant wounds after pruning?
- A. Asphalt varnish with antiseptic
 - B. Asphalt with antibiotic
 - C. Petroleum jelly
 - D. Latex paint
118. How should pruning be done in order to thin out the crown of a tree?
- A. Cut to a main branch
 - B. Cut to a bud
 - C. Pinch the tips of branches
 - D. Remove branches leaving stubs
119. Tree response, when measured by the number of new branches produced, is lowest when a main branch is:
- A. pinched
 - B. cut to a bud
 - C. cut to a larger branch
 - D. cut to the trunk

120. Pruning certain branches from a tree to maintain its natural shape is called:
- A. heading back
 - B. thinning
 - C. espalier pruning
 - D. topiary pruning
121. What growth should be removed from a hedge during maintenance pruning?
- A. Irregular sprouts only
 - B. One-third of the hedges height
 - C. One-half of the hedges height
 - D. All the irregular sprouts and a slight amount of older growth
122. Which shape is considered best for a pruned hedge?
- A. Wider at the top than at the bottom
 - B. Same width at the bottom and top
 - C. Wider at the bottom than at the top
 - D. None of the above
123. Proper pruning procedure for shearing a hedge involves:
- A. using only sharp tools
 - B. shaping such that all surfaces receive light
 - C. cutting the hedge slightly undersize
 - D. all of the above
124. The best way to determine if a chemical is flammable is to:
- A. feel it with the tip of your finger
 - B. smell it to see if it gives off fumes
 - C. try to light a small amount on fire
 - D. read the product label
125. Flammable chemicals are dangerous because they:
- A. ignite easily
 - B. do not break down in the environment
 - C. cause serious poisoning even in very small amounts
 - D. are corrosive
126. Which of these label warnings helps to identify flammable chemicals?
- A. "Environmental hazard"
 - B. "Danger-poison"
 - C. "Physical or chemical hazard"
 - D. "Keep out of reach of children"
127. A storage place for agricultural chemicals should have:
- A. fire resistant construction
 - B. good lighting
 - C. a lock on the door
 - D. all of the above
128. Which type of room would be most appropriate for storing agricultural chemicals?
- A. A humid storage room
 - B. A well ventilated room
 - C. A dark, well sealed room
 - D. A room with a stable, high temperature

129. Which of the following is a good safety precaution when dealing with agricultural chemicals?
- A. Transfer chemicals that come in paper packages to metal or glass containers
 - B. Keep pesticide storage room well sealed to avoid the escape of toxic fumes
 - C. Store chemical fertilizers and pesticides together in the same room
 - D. None of the above
130. How should agricultural chemicals be stored?
- A. In original containers
 - B. With separate storage for pesticides and fertilizers
 - C. In a ventilated storage area
 - D. All of the above
131. Which of these insects can attack plant roots?
- A. Aphids
 - B. Mealy bugs
 - C. Thrips
 - D. White flies
132. Which type of insect will cause a black, sooty appearance on leaves and stems?
- A. Caterpillars
 - B. Honeydew producing insects
 - C. Grasshoppers
 - D. Ladybugs
133. The best time to spray diseased landscape plants is when the:
- A. soil is moist
 - B. sun is bright
 - C. wind is blowing
 - D. temperature is high
134. Which pesticide formulation should be applied to foliage in a dry form?
- A. Emulsifiable concentrate
 - B. Dust
 - C. Wettable powder
 - D. Granule
135. Which is the correct way to apply a pesticide labeled WP (Wettable Powder)?
- A. Mix with soil and apply water
 - B. Apply as a dry powder to wet foliage
 - C. Apply as a dry powder to the soil surface and wet with water
 - D. Mix with water and spray on foliage or use as a soil drench
136. Which type of weed germinates from seed and grows a rosette of leaves in the first year; produces seed and dies the second year?
- A. Summer annuals
 - B. Winter annuals
 - C. Biennials
 - D. Perennials

137. How can damage to nearby plants be best avoided when spraying lawn weeds?
- A. Keep spray nozzle close to the ground
 - B. Reduce the concentration of the chemical by 1/2
 - C. Adjust the spray nozzles to produce a finer spray
 - D. Increase spray pressure
138. If a tractor mounted sprayer is applying pesticides at a higher rate than desired, the most appropriate change would be to:
- A. remove some of the nozzles from the spray boom and replace them with plugs
 - B. reduce pressure of the spray pump
 - C. use less water in spray mix
 - D. drive the tractor at a slower speed
139. What is the purpose of wrapping burlap around the root ball of transplanted trees?
- A. To protect roots from disease
 - B. To protect roots from heat
 - C. To hold root ball together and prevent drying of the roots
 - D. To protect roots from cold
140. What size of a hole should be dug for planting a bareroot tree?
- A. Equal in diameter to the spread of the roots but somewhat shallower than the previous location
 - B. Slightly smaller in diameter than the spread of the roots
 - C. Deeper than the tree was originally grown
 - D. The same depth as the tree was originally grown
141. What is the proper way to use guy wires to brace a newly planted tree with a diameter of 2 inches or less?
- A. Place 3 stakes in an equilateral triangle around the trunk
 - B. The guy wires should hold the trunk at a point where it branches
 - C. Cover the wires with a section of rubber hose where they contact the tree
 - D. All of the above
142. How should plants be trained to grow on an arbor?
- A. Prune most front and back branches
 - B. Prune top and lower branches to form level planes
 - C. Interweave side branches with adjacent branches
 - D. All of the above
143. What is the biggest problem caused by tree cavities?
- A. Cavity will usually kill the tree
 - B. Cavity often harbors pests
 - C. Disease that causes cavity can spread to other trees
 - D. Cavity reduces trunk strength
144. What is accomplished by applying tree paint to a branch wound?
- A. Prevent contamination of wound with harmful microorganisms
 - B. Protect wounded branch from decay
 - C. Promote healing of wound
 - D. None of the above. Tree paint actually has very little effect
145. What is the purpose of cable bracing of tree limbs?
- A. To separate branches in narrow crotches
 - B. To avoid the splitting of crotches
 - C. To keep a tree from uprooting in strong winds
 - D. To change the shape of the tree

146. What is the main reason for bracing a V-crotch with a cable?
- A. Stimulate faster growth in the crotch area
 - B. Bring the two branches closer together
 - C. Prevent splitting of crotch
 - D. Move the two branches further apart
147. When a tree is to be killed by girdling:
- A. a special kind of knife is used to do the job
 - B. the tree can be expected to die very quickly
 - C. a ring of both bark and cambium must be removed from around the trunk
 - D. the tree's roots must be cut back
148. The material that should be used to make covers for protecting plants from frost should be:
- A. a good conductor of temperature
 - B. placed just touching the plant foliage
 - C. capable of absorbing moisture
 - D. none of the above
149. The quickest way to reestablish sod cover over worn out spots in a lawn is by:
- A. sprigging
 - B. sodding
 - C. plugging
 - D. seeding
150. What effect will adding compost have on garden soil?
- A. Increased water holding capacity
 - B. Loosen tight or easily packed soil
 - C. Add nutrients
 - D. All of the above
151. What is the primary value of leaf compost as a soil amendment?
- A. A source of plant nutrients
 - B. Helps control plant diseases
 - C. Helps control insects
 - D. Increases water holding capacity of soil
152. Which of these is part of the proper procedure for preparing a compost?
- A. Add fertilizer and lime to the compost pile
 - B. Add water to the compost pile
 - C. Keep the top surface of the pile flat or slightly concave
 - D. All of the above
153. What should be done to speed up the decomposition of composted materials?
- A. Add only dry organic materials to the pile
 - B. Cover the compost pile during rainy weather
 - C. Keep the compost pile moist
 - D. Pile the materials into a cone shape so that water will run off easily
154. Which is the best way to apply a large amount of compost to the soil?
- A. Apply the compost to the rows only
 - B. Spread the compost in a single layer and water to help it settle
 - C. Spread all the compost in a single layer and till into the soil
 - D. Spread and till half of the compost, then repeat with remaining half

155. When is the best time to apply compost to a garden?
A. Before planting
B. At the same time as planting, layering the compost between the rows
C. After planting, layering the compost around the base of the plants
D. Just before the plants begin to flower
156. Which of these, if recommended, should be incorporated into the soil before planting grass seed?
A. Dolomite
B. Dolomite and Superphosphate
C. Dolomite, Superphosphate, and minor elements
D. Dolomite, Superphosphate, minor elements and Ammonium Nitrate
157. Which is the best order of steps in preparing a seedbed for a lawn?
A. Apply fertilizer, till soil, plant seed
B. Till soil, apply fertilizer, plant seed
C. Till soil, plant seed, apply fertilizer
D. Till soil, plant seed, let seed germinate, apply plant food
158. Which is the main reason for incorporating organic matter to convert subsoil to topsoil?
A. Organic matter contains a high level of available nutrients
B. Organic matter contains the proper proportions of nutrients
C. Organic matter helps to hold fertilizer in the soil and prevents leaching
D. Organic matter acts as a substitute for lime in the soil
159. What is the most important material to incorporate to convert subsoil to topsoil?
A. Lime
B. Fertilizer
C. Organic matter
D. Clay
160. What is one main reason for incorporating organic material to convert subsoil to topsoil?
A. Organic material contains ideal proportions of nutrients
B. Organic material contains higher quality nutrients than inorganic fertilizers
C. Organic materials improve the physical properties of the soil
D. Organic material in the soil helps control plant pests
161. What is the main reason for adding topsoil to an area where topsoil has been depleted?
A. To prevent erosion
B. To improve the soil pH
C. To add organic matter that will hold nutrients
D. To prevent plant disease
162. How can soil fumigant be applied to garden soil?
A. Pour fumigant into holes about 10 inches apart
B. Sprinkle fumigant over entire area, then wet with water
C. Sprinkle fumigant over entire area and cover with plastic
D. Any of the above

163. Which of these is a proper use of soil fumigants?
- A. To kill soil born insects in a lawn
 - B. To kill weeds growing among shrubs
 - C. To kill pests in the soil before planting
 - D. All of the above
164. Which of these is a benefit of soil fumigation?
- A. Fumigation kills many weed seeds in the soil
 - B. Residual effects protect crop from disease
 - C. Fumigation speeds up the breakdown of organic matter
 - D. Residual effects protect crops from insects
165. Which of these would be an appropriate use of a granular or powdered soil sterilant?
- A. Kill weed seeds in a Bahia grass lawn
 - B. Control root rot fungus in a shrub hedge
 - C. Kill disease microorganisms in a pile of potting soil
 - D. Kill soil born insects in ground cover roots
166. How does the use of an aerator benefit a compacted lawn?
- A. Increases the multiplication of microorganisms
 - B. Speeds up the decomposition of organic matter
 - C. Increases the oxygen content in the soil
 - D. All of the above
167. Which of these is the proper use of an aerator?
- A. To blow fertilizer over a lawn area
 - B. To settle soils that are too loose
 - C. To punch holes in a compacted area of lawn
 - D. To dry out wet grass on an athletic field or golf course
168. Which of these is part of the correct procedure for applying fertilizer by the punch bar method?
- A. Apply more fertilizer to holes near the trunk
 - B. Make no holes beyond the drip line of the tree
 - C. Use very high concentration fertilizer
 - D. Irrigate thoroughly after fertilizing
169. The "punch bar" method is used to fertilize:
- A. turf grasses
 - B. trees
 - C. row crops
 - D. flower beds
170. What type of fertilizer is best for use in the "punch bar" method?
- A. Ammonium Nitrate
 - B. Any high analysis, soluble fertilizer
 - C. Granular, slow release fertilizer
 - D. Liquid fertilizer, high in micronutrients
171. Which is the best way to control soil erosion in open fields caused by water?
- A. Construct windbreaks
 - B. Keep the soil plowed
 - C. Construct drainage canals
 - D. Plant cover crops

172. Which of these is a method for controlling wind erosion?
- A. Contour planting
 - B. Mole drains
 - C. Strip planting of sod
 - D. Constructing terraces
173. What should be removed when a hoe is sharpened?
- A. The paint
 - B. Any gaps or nicks
 - C. The bevel
 - D. The handle
174. What is the first thing that should be done when repairing a leaky faucet?
- A. Remove the cap of the faucet
 - B. Remove the screw that holds the seat washer
 - C. Dress the seat washer
 - D. Turn off the water at its source
175. Which end of an extension cord is referred to as the male end?
- A. A broken end
 - B. The end with the socket holes
 - C. The end with two metal prongs
 - D. None of the above
176. Power scythes (weed trimmers) using nylon string are more popular than those with steel blades because they:
- A. are often more expensive
 - B. cut better
 - C. are safer
 - D. are always heavier
177. Why is it important to clean a fertilizer spreader after use?
- A. Fertilizer is very corrosive
 - B. Fertilizer becomes toxic if it remains in the spreader
 - C. Fertilizer left in a spreader will attract pests
 - D. All of the above
178. What should be done before lubricating through the grease fittings on a tractor?
- A. Wash the tractor with soap and water
 - B. Check the engine oil level of the tractor
 - C. Wipe off the fittings with a clean cloth
 - D. Check and adjust all belts on the tractor
179. How much grease should be injected into an unsealed bearing with a grease gun?
- A. Enough to cause old grease to appear around the edges
 - B. Enough to force old grease out and new grease to appear around the edges
 - C. Two full strokes of the grease gun handle
 - D. Three full strokes of the grease gun handle
180. Before the dipstick or oil filler plug is removed from a small engine, make sure that:
- A. the engine is stopped
 - B. the engine is level
 - C. the area around the dipstick is clean
 - D. all of the above

181. A small engine's oil should be checked :
A. when the engine is running
B. when the engine is warm
C. when the engine is cold
D. before the engine is started
182. Before changing the oil in a four cycle engine it is best to stop the engine and:
A. disconnect the spark plug wire
B. drain the fuel
C. pull out the dip stick
D. let the engine cool
183. Under inflated tires on a tractor-mower can cause:
A. tire slippage
B. excessive wear
C. a low or uneven cut
D. all of the above
184. Over-inflated rear wheels on a tractor cause a smaller part of the tire to make contact with the ground and can cause:
A. faster tire wear
B. overheating of the tractor
C. tipping of the tractor
D. all of the above
185. How should one check for tread and sidewall cuts, fabric breaks, cracks, and wire or glass embedded in tractor tires?
A. By holding the tire under water
B. By making a visual inspection
C. By over-inflating the tire
D. By spraying tire with a detergent solution
186. Anytime a distributor cap is removed it is important to check for:
A. faulty wiring
B. loose screws
C. cracks
D. rust
187. Which type of carburetor air cleaner should be washed with hot water and detergent?
A. Oil bath
B. Oiled filter
C. Dry filter
D. None of the above
188. Regular servicing of belt drives on groundskeeping equipment should include:
A. replacing pulleys
B. coating the belts with lubricant
C. checking the belt alignment and tension
D. all of the above

189. What usually delivers the driving force to the pulleys on a variable speed transmission?
- A. V-belt
 - B. Chain
 - C. Drive shaft
 - D. Electromagnet
190. What should be the first step before painting a piece of equipment?
- A. Clean off any dirt, rust and old paint
 - B. Straighten dents
 - C. Sand rough areas
 - D. Prime bare areas
191. Before storing a paint gun after use, one should:
- A. refill with paint for next time
 - B. adjust the paint gun
 - C. clean the paint gun with turpentine
 - D. flush the system with gasoline
192. What safety precaution should be taken before cleaning an electric motor?
- A. Wear protective clothing
 - B. Wear eye protection
 - C. Disconnect from electric power source
 - D. Wear rubber gloves
193. What information must be known before ordering repair parts for motor vehicles or power equipment?
- A. Name of manufacturer
 - B. Model number
 - C. Descriptive name of part
 - D. All of the above

APPENDIX C
TASK LIST
LANDSCAPE OPERATIONS

STUDENT OCCUPATIONAL COMPETENCY ACHIEVEMENT TESTING
ENTRY LEVEL SKILLS

LANDSCAPE OPERATIONS

- A. Identify Landscape Plants
 - 1. Identify Landscape Plants
- B. Designing Landscapes
 - 2. Analyze residential site for Landscape Purpose
 - 3. Analyze residential site for family preference
 - 4. Analyze site for soil types
 - 5. Design Public Area
 - 6. Design outdoor privacy area
 - 7. Design service area
 - 8. Design flower garden
 - 9. Design a vegetable garden for service area
 - 10. Design garden equipment storage
 - 11. Design outdoor play area
 - 12. Design for off-site factors
 - 13. Design circulation structures
 - 14. Design Outdoor Lighting System
 - 15. Design drainage system
 - 16. Estimate cost of landscape proposal
- C. Designing and Maintaining Interior Plantscape
 - 16. Analyze site
 - 17. Designing Interior Plantings
 - 18. Selection of plant materials and supplies
 - 19. Establishment of Plants
 - 20. Maintaining Interior Plantscape

- D. Interpret laws regulating the landscape industry
 - 21. Interpret laws regulating the landscape industry
- E. Demonstrate leadership, employability, communication and human relation skills
 - 22. Prepare planting instructions on balled and burlap stock and on container stock
 - 23. Taking phone orders and writing customer orders
 - 24. Provide verbal information on care of evergreen trees and deciduous house plants
 - 25. Follow up landscape project
 - 26. Aid customer in the selection of tree or shrub, flowering and house plant
 - 27. Fill customer order for plants and merchandise
 - 28. Demonstrate use of spreader
 - 29. Describe purpose and quality of merchandise

APPENDIX D
MASTERY TEST
LANDSCAPE OPERATIONS

EXAM LANDSCAPE

1. Which is the most important piece of information collected during a site analysis for an interior plantscape?
 - A. Size of the planter
 - B. Amount and type of available light
 - C. Style of the planter
 - D. Type of soil
2. Where should large foliage plants be positioned in an interior corner planting?
 - A. In the front of the planter
 - B. In the center of the planter
 - C. Slightly off center
 - D. In the rear of the planter
3. Which arrangement is best for a circular planter in an interior plantscape?
 - A. Large foliage plants should be centrally located in the planter
 - B. Low growing plants should be centrally located in the planter
 - C. Large foliage plants should be located near the outside of the planter
 - D. Low growing plants should be located slightly off center in the planter
4. Which is the most important characteristic to consider in selecting plants for an interior plantscape?
 - A. Flower all year long
 - B. Colorful foliage
 - C. Adaptability to indoor conditions
 - D. Fast growth
5. What is the main drawback to using bark chips or sawdust as a mulch in an interior plantscape?
 - A. The mulch decomposes too quickly
 - B. Bacteria that decompose these materials use Nitrogen
 - C. It is difficult to wet this type of mulch
 - D. Unpleasant odor
6. Which is the best way to acclimatize a plant to an indoor location?
 - A. Introduce the plant directly into the indoor environment
 - B. Introduce the plant into complete darkness for 2 weeks
 - C. Gradually modify the plants environment to simulate interior conditions
 - D. Introduce the plant into complete sunlight for 2 weeks
7. What is the main reason for mulching plant beds in an interior plantscape?
 - A. Reduction of odors
 - B. Conservation of moisture
 - C. Extra nutrients provided by the mulch
 - D. All of the above

8. What is the best method for watering plants in an interior plantscape?
 - A. Apply a fine mist once a week
 - B. Pour a small amount of water over the leaves and soil about once a week
 - C. Water the soil heavily once a week
 - D. Water thoroughly when the soil is dry to the touch
9. The proper amount and type of fertilizer to be applied to interior plants is determined by:
 - A. the amount of water applied
 - B. the amount of available light
 - C. soil type
 - D. all of the above
10. Prior to designing a landscape one should:
 - A. review the local planting codes
 - B. install turf
 - C. install the sprinkler system
 - D. install decorative lighting
11. Which is the main reason for using scientific names rather than common names in plant identification?
 - A. Scientific names are easy to remember
 - B. The same plant may have several common names
 - C. Scientific names are very descriptive
 - D. Customers are impressed by scientific names
12. A "samara" is a:
 - A. flat-topped inflorescence
 - B. dry, winged fruit
 - C. leaf arrangement on a stem
 - D. type of sticky leaf surface
13. A spatulate leaf form is:
 - A. triangular shaped
 - B. kidney shaped
 - C. heart shaped
 - D. flattened spoon shaped
14. What should be done with native vegetation and natural rock features in a residential site that is to be landscaped?
 - A. Remove them from the site
 - B. Preserve them in the landscape design
 - C. Remove them to the edge of the landscape
 - D. Make them dominate the landscape design
15. "Microclimate" refers to the temperature, precipitation, humidity and winds in a:
 - A. state
 - B. district
 - C. city or town
 - D. small area such as a yard

16. In the development of a landscape plan, the site considerations should include:
 - A. topography
 - B. soil
 - C. natural vegetation and features
 - D. all of the above
17. What step should be first in planning a landscape on a residential site?
 - A. Establish the sod
 - B. Fence the area
 - C. Compile a family checklist of needs and desires
 - D. Removal of existing vegetation
18. If the soil on a landscape site is found to have a pH of 4.5, it would be considered:
 - A. very acid
 - B. very basic
 - C. slightly acid to slightly basic
 - D. neutral
19. Soil acidity on a landscape site can be reduced by adding:
 - A. Ammonium Sulfate
 - B. Dolomitic Limestone
 - C. Potassium Chloride
 - D. Ammonium Nitrate
20. Which substance, when added to soil, will do the most to improve drainage?
 - A. Peat
 - B. Sand
 - C. Clay
 - D. Loam
21. In a residential landscape design, the public area is the property:
 - A. at the rear of the house
 - B. between the house and the road
 - C. containing gardens, pools or fountains
 - D. screened by fencing
22. In designing a residential landscape site, which of the following should NOT be included in the public area?
 - A. Tree plantings
 - B. Shrub plantings
 - C. Lawn area
 - D. Flower beds
23. What should be the focal point of the landscape design for a public area on a residential site?
 - A. Recreation area
 - B. Flower beds
 - C. Front door
 - D. Fountain, sculpture or bird bath
24. A privacy area in a residential landscape design should be a/an:
 - A. enclosed area, separate from other areas
 - B. extension of the house to the outdoors
 - C. storage area for clotheslines, tools and equipment
 - D. confinement area for pets

25. The design for a privacy area should be based on how it will appear from:
- A. within the house
 - B. neighboring homes
 - C. the street
 - D. the back yard
26. A privacy area on a residential site will often include:
- A. lawn and garden storage
 - B. clotheslines
 - C. greenhouses
 - D. garden embellishments (Birdbaths, etc.)
27. The service area in a residential landscape design should be located:
- A. in the public area
 - B. in the private area
 - C. close to the house for convenience
 - D. near the driveway
28. A service area in a residential landscape design should include:
- A. patio and terraces
 - B. all service facilities that can be screened
 - C. garden embellishments
 - D. recreation and sports areas
29. Which is the material most frequently used to screen service areas in residential landscape design?
- A. Shrubs
 - B. Flower borders
 - C. Fencing
 - D. Tree plantings
30. In which part of a residential landscape design would a flower bed be most appropriate?
- A. Public areas
 - B. Privacy areas
 - C. Service areas
 - D. all areas
31. Which is the best way to incorporate flower plantings into a landscape design?
- A. Spot flowers throughout the landscape
 - B. Use mass flower materials in "drifts"
 - C. Use both sun-loving and shade-loving flowers in the same bed
 - D. Use many colors within the same planting
32. Which is the best design for flower beds in a landscape?
- A. Use many types and colors of flowers in the same bed
 - B. Use one type and color of flower in each bed
 - C. Use the flower bed as the focal point of the design
 - D. Use the flowers as a permanent framework for the landscape
33. Where would it be most appropriate to include a vegetable garden in a residential landscape design?
- A. Public area
 - B. Private area
 - C. Service area
 - D. Community area

34. Which of these vegetables requires a large growing area to yield well, making it poorly suited for home gardens?
- A. Tomatoes
 - B. Peppers
 - C. Corn
 - D. Cabbage
35. In what area of a residential landscape design should equipment storage be included?
- A. Public area
 - B. Private area
 - C. Service area
 - D. Community area
36. An outdoor play area should be designed for maximum:
- A. Space
 - B. Shade
 - C. Variation
 - D. Safety
37. The location for an outdoor playground area should be:
- A. A long distance from the house
 - B. On a soft surface
 - C. In direct sunlight
 - D. On a concrete surface
38. A landscape designer should generally attempt to:
- A. remove any native vegetation from landscape site
 - B. enhance the natural features of the area
 - C. grade the landscape site to eliminate any slope
 - D. fence the property before planting
39. Functional lighting which guides people along dark walkway areas should be located:
- A. at eye level
 - B. well below eye level
 - C. well overhead
 - D. at a distance, using spot lights
40. A good plant used in home landscaping to discourage burglars is:
- A. Border Grass
 - B. Crown of thorns
 - C. Live Oak
 - D. Ligustrum
41. What grade should be maintained for adequate drainage in turf and planted areas?
- A. 1%
 - B. 5%
 - C. 10%
 - D. 15%
42. Grading a landscape area should shape the ground in such a way that:
- A. Water will flow away from structures
 - B. Water will flow toward structures
 - C. Water will settle in one area
 - D. Water will settle evenly over the entire property

43. Which of these is NOT generally included in a designer's price estimate for a landscape proposal?
- A. Site analysis fee
 - B. Landscape design fee
 - C. Cost of construction materials
 - D. Sprinkler installation fee
44. What type of plant is most frequently balled and burlapped for transport?
- A. Flowering shrubs
 - B. Deciduous trees
 - C. Running shrubs
 - D. Ground covers
45. What should be done before planting a containerized shrub that has become rootbound?
- A. Remove all soil from the root system
 - B. Make three or four vertical cuts through the soil and roots
 - C. Remove half of the root system
 - D. Soak the plant in water overnight
46. Before approving a charged order for merchandise, the salesperson should:
- A. substitute out-of-stock items with less expensive items
 - B. fill latest orders first
 - C. check customer's credit rating
 - D. hold the entire order until out-of-stock items arrive
47. Which is the most important characteristic in selecting deciduous shrubs?
- A. Height
 - B. Number of stems
 - C. Buds
 - D. Flowers
48. Which of these would be the best selection as an indoor, hanging house plant?
- A. Split-leaf Philodendron
 - B. Bird Nest Fern
 - C. Crown Of Thorns
 - D. Pothos
49. When is the best time to transplant a bare-root deciduous plant?
- A. Early or late summer
 - B. Late spring or early summer
 - C. Early spring or late fall
 - D. Late summer or early fall
50. Following completion of a landscape job, the supervisor should:
- A. inspect the quality of the job prior to billing
 - B. bill the client immediately
 - C. begin the next project and bill at the end of the month
 - D. file billing until the client calls
51. Which of these would be a suitable house plant to recommend for filtered light setting, needing low maintenance?
- A. Anthurium
 - B. Chinese evergreen
 - C. Shrimp plant
 - D. Crown of thorns

52. Which of these would be best to recommend to a client who requests a cold hardy, flowering tree?
- A. Frangipani
 - B. Orchid tree
 - C. Southern Magnolia
 - D. Royal Poinciana
53. What should be done with plants or merchandise that have been selected to fill an order, and be delivered at the end of the week?
- A. Leave in the stock area until delivery day
 - B. Tag and remove to a protected holding area
 - C. Tag and load onto delivery trucks
 - D. Tag and remove to loading area
54. What is the most common problem associated with fertilizer applications using a drop-type spreader?
- A. Overlapping of fertilizer
 - B. Different size particles spread in different pattern
 - C. Sparse coverage
 - D. Heavy coverage
55. What is the most common problem associated with application of fertilizer or seed using a rotary spreader?
- A. Overlapping of materials
 - B. Different size particles spread in a different pattern
 - C. Sparse coverage
 - D. Heavy coverage
56. Which type of mower is generally recommended for commercial use on athletic fields, parks or golf courses?
- A. Rotary mower
 - B. Reel-type mower
 - C. Belly mower
 - D. Sulky mower
57. Which type of sprinkler head or irrigation system should be recommended for maximum water conservation in a narrow area of garden or flower bed?
- A. Trickle system
 - B. Rotating stream head
 - C. Impulse sprinkler
 - D. Whirling sprinkler

KEY *KEY* *KEY* *KEY* *KEY* *KEY* *KEY* *KEY* *KEY* *KEY* *KEY* *KEY*

EXAM LANDSCAPE

1. B	26. D	51. B
2. D	27. C	52. C
3. A	28. B	53. B
4. C	29. C	54. A
5. B	30. B	55. B
6. C	31. B	56. B
7. B	32. B	57. A
8. D	33. C	
9. D	34. C	
10. A	35. C	
11. B	36. D	
12. B	37. B	
13. D	38. B	
14. B	39. B	
15. D	40. B	
16. D	41. B	
17. C	42. A	
18. A	43. A	
19. B	44. B	
20. B	45. B	
21. B	46. C	
22. D	47. B	
23. C	48. D	
24. B	49. C	
25. A	50. A	

APPENDIX E
PERFORMANCE TEST I
GARDENING-GROUNDSKEEPING AND LANDSCAPE OPERATIONS

Student Instructions
Evaluation Form
Examiner Guide

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

PERFORMANCE TEST I

JOB 1: Take Softwood Cuttings

1. Read all seven (7) steps on this page before proceeding
2. Go to the designated area for Job 1
3. Using the equipment provided, take three (3) cuttings from the designated plant
4. Trim the cuttings
5. Place the cuttings in containers
6. Return all tools and equipment to their pretest condition
7. Inform the examiner when you have completed Job 1

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

PERFORMANCE TEST I

JOB 1: Take Softwood Cuttings

STUDENT ACTIVITY

Given a sharp pruning knife or shears, a softwood tree or shrub and plastic bag containers, the student will take three cuttings and store them such that at least two of the three will survive to take root.

Preparation for the test

1. Have all tools and materials for Job 1 available for the student.
2. Make sure that the student has a copy of, and has read, the instructions for Job 1.

Special Considerations

1. Knife or shears must be clean and sharp
2. Cuttings should be 4 to 6 inches long with 3 or 4 nodes and several leaves
3. Cut made at 45 degree angle just below lowest node
4. Trim cuttings - large leaves cut in half, flowers or buds removed
5. Place cuttings in plastic bags, store in a cool place

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

JOB 1: Take Softwood Cuttings

Process	Related Product	Item No.	Yes	No
A. Collect equipment	H	1		
B. Select shoots (4" to 6", with 3 or 4 nodes)	I	2		
C. Cut shoot at 45 degree angle just below lowest node	I	3		
D. Trim large leaves (Cut in half)	J	4		
E. Remove flowers or buds	J	5		
F. Wrap cuttings in plastic	K	6		
G. Store in cool place	K	7		
Product	Related Process	Item No.	Yes	No
H. Equipment collected	A	8		
I. Cuttings taken	B,C	9		
J. Cuttings trimmed	D,E	10		
K. Cuttings stored	F,G	11		

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

PERFORMANCE TEST I

JOB 2: Use a Nylon String Weed Trimmer to Trim a Lawn Area

1. Read all five (5) steps on this page before proceeding
2. Go to the designated area for Job 2
3. Using the tools and materials provided, trim areas of the lawn that cannot be reached by a lawnmower
4. Return all tools and materials to their pretest condition
5. Inform the examiner when you have completed Job 4

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

PERFORMANCE TEST I

JOB 2: Use a Nylon String Weed Trimmer to Trim a Lawn Area

STUDENT ACTIVITY

Given a nylon string weed trimmer, fuel and extra line, the student will trim the areas of a lawn not reached by a lawn mower. The grass in these areas should be trimmed to the same height as surrounding mowed areas.

Preparation for the Test

1. Have all tools and materials for Job 1 available for the student.
2. Make sure that the student has a copy of, and has read, the instructions for Job 1.

Special Considerations

1. Check fuel, refuel if needed
2. Feed out recommended length of line (about 8 in.) add line if needed
3. Follow safety precautions - wear long pants, hard shoes
4. Cut grass to same level as surrounding mowed areas

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

JOB 2: Use a Nylon String Weed Trimmer to Trim a Lawn Area

Process	Related Product	Item No.	Yes	No
A. Check fuel level, refuel if needed	A	1		
B. Adjust line length, add line if needed	B	2		
C. Wear proper safety gear (long pants, hard shoes, eye protection)	C	3		
D. Start trimmer	D	4		
E. Trim lawn	D	5		
F. Put equipment away	E	6		

Product	Related Process	Item No.	Yes	No
A. Fuel level full	A	7		
B. Line at proper length (app. 8 in.)	B	8		
C. Proper clothing and safety gear worn	C	9		
D. Lawn trimmed	D,E	10		
E. Equipment stored	F	11		

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

PERFORMANCE TEST I

JOB 3: Transplant Containerized Annual Bedding Plants

1. Read all five (5) steps on this page before proceeding
2. Go to the designated area for Job 3
3. Using the tools and materials provided, transplant five (5) bedding plants
4. Return all tools and materials to their pretest condition
5. Inform the examiner when you have completed Job 3

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

PERFORMANCE TEST I

JOB 3: Transplant Containerized Annual Bedding Plants

STUDENT ACTIVITY

Given containerized annual bedding plants, a seedbed area, digging tools and a water source, the student will transplant five (5) plants such that four of the five survive for at least two weeks after planting.

Preparation for the test

1. Have all tools and materials for Job 1 available for the student.
2. Make sure that the student has a copy of, and has read, the instructions for Job 1.

Special Considerations

1. Check and adjust soil moisture prior to planting
2. Dig a hole slightly deeper and about twice the width of the containers
3. Plant with top of root ball flush with seedbed surface
4. Provide water and shade for seedlings

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

JOB 3: Transplant Containerized Annual Bedding Plants

Process	Related Product	Item No.	Yes	No
A. Check and adjust moisture level of seedbed	A	1		
B. Dig holes (slightly deeper about twice the width of rootball)	B	2		
C. Cut container away from plant	C	3		
D. Set plant in hole	C	4		
E. Fill in with soil beneath and around rootball	C	5		
F. Water thoroughly	D	6		
G. Provide shade for plants	D	7		

Product	Related Process	Item No.	Yes	No
A. Seedbed moist	A	8		
B. Holes prepared	B	9		
C. Seedlings transplanted	C,D,E	10		
D. Water and shade provided	F,G	11		

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS
PERFORMANCE TEST I

JOB 4: Identify and Lubricate Grease Fittings on a Tractor

1. Read all six (6) steps on this page before proceeding
2. Go to the designated area for Job 1
3. Using the operator's manual, locate all the grease fittings on the tractor
4. Using the equipment provided, lubricate all the fittings on the tractor
5. Return all tools and equipment to their pretest condition
6. Inform the examiner when you have completed Job 1

GARDENING-GROUNDSKEEPING
and
PERFORMANCE TEST I.

PERFORMANCE TEST I

JOB 4: Identify and Lubricate Grease Fittings on a Tractor

STUDENT ACTIVITY

The student will locate and grease all the fittings on the tractor. The operator's manual can be used to locate fittings. The fittings should be wiped clean before grease gun is applied. Enough grease should be pumped into the fittings to force old grease out. Excess grease should be then wiped from the fittings.

Preparation For The Test

1. Have all tools and materials for Job 1 available for the student.
2. Make sure that the student has a copy of, and has read, the instructions for Job 1.

Special Considerations

1. Locating all grease fittings on the tractor
2. Cleaning the fittings before greasing
3. Pumping enough grease into fittings
4. Cleaning the fittings after greasing

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS
PERFORMANCE TEST I

JOB 4: Identify and Lubricate Grease Fittings on a Tractor

Process	Related Product	Item No.	Yes	No
A. Locate grease fittings	A	1		
B. Clean grease fittings	B	2		
C. Insert grease tube into the grease gun	C	3		
D. Inject grease into fittings	D	4		
E. Wipe off excess grease	E	5		
F. Clean equipment after use	F	6		

Product	Related Process	Item No.	Yes	No
A. Grease fittings located	A	7		
B. Grease fittings cleaned	B	8		
C. Grease tube in grease gun	C	9		
D. Grease injected into fittings	D	10		
E. Excess grease wiped off	E	11		
F. Equipment cleaned	F	12		

GARDENING-GROUNDSKEEPING
and
LANDSCAPING OPERATIONS

PERFORMANCE TEST I

JOB 5: Demonstrate Tool Sharpening Using a Stationary Grinder

1. Read all five (5) steps on this page before proceeding
2. Go to the designated area for Job 4
3. Using the tools and materials provided, demonstrate tool sharpening with a stationary grinder
4. Inform the examiner when you have completed Job 4

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

PERFORMANCE TEST I

JOB 5: Demonstrate Tool Sharpening Using a Stationary Grinder

STUDENT ACTIVITY

The student will sharpen a steel tool such as a hoe or mower blade using a stationary grinder. Proper safety equipment MUST be used, including safety glasses or goggles. The student should select the proper grinding wheel and adjust the tool rest. The grinder should be turned on and allowed to come to full speed before grinding begins. The tool should be held at an angle such that the original bevel is maintained.

Preparation for the Test

1. Have all tools and materials needed for Job 4 available for the student.
2. Make sure that the student has a copy of, and has read, instructions for Job 4.

Special Considerations

1. Using proper safety equipment including shield and glasses
2. Maintaining original bevel on edge of tool
3. Turning off machine after grinding

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

JOB 5: Demonstrate Tool Sharpening Using a Stationary Grinder

Process	Related Product	Item No.	Yes	No
A. Select and install proper grinding wheel for tool sharpening (60-grit for most)	A	37		
B. Wear eye protection	B	38		
C. Adjust tool rest	C	39		
D. Start grinder, standing to one side	D	40		
E. Allow machine to come to speed before grinding	D	41		
F. Grind the tool - cutting edge against direction of rotation - maintain original bevel - cool the tool frequently	E	42		
G. Turn off grinder	F	43		

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

JOB 5: Demonstrate Tool Sharpening Using a Stationary Grinder

Product	Related Process	Item No.	Yes	No
A. Proper wheel installed	A	44		
B. Eye protection worn	B	45		
C. Tool rest adjusted	C	46		
D. Grinder started	D,E	47		
E. Tool Sharpened	F	48		
F. Grinder stopped	G	49		

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

PERFORMANCE TEST I

JOB 6: Clean Leaves and Debris From an Area Using a Power Blower

1. Read all six (6) steps on this page before proceeding
2. Go to the designated area for Job 6
3. Using the equipment provided, clean the area of leaves and debris
4. Return all tools and equipment to their pretest condition
5. Inform the examiner when you have completed Job 6

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

PERFORMANCE TEST I

JOB 6: Clean Leaves and Debris from an Area Using a Power Blower

STUDENT ACTIVITY

Given a power blower, rake and disposal bags, the student will clean a lawn area of leaves and other debris. There should be NO visible debris in the area upon completion.

Preparation for the Test

1. Have all tools and materials for Job 6 available for the student.
2. Make sure that the student has a copy of, and has read, instructions for Job 6.

Special Considerations

1. Check fuel level
2. Use safety precautions (eye and ear protection)
3. Pick up large items by hand
4. Sweep debris into central location for pick-up

GARDENING-GROUNDSKEEPING
and
LANDSCAPE OPERATIONS

PERFORMANCE TEST I

JOB 6: Clean Leaves and Debris from an Area Using a Power Blower

Process	Related Product	Item No.	Yes	No
A. Check and adjust fuel level of blower	A	1		
B. Wear proper safety equipment (eye and ear protection)	B	2		
C. Start blower	C	3		
D. Move leaves and debris to center of area	D	4		
E. Pick up large items by hand	D	5		
F. Place debris in trash containers	D	6		
G. Put equipment away	E	7		

Product	Related Process	Item No.	Yes	No
A. Fuel level full	A	8		
B. Safety equipment worn	B	9		
C. Blower started	C	10		
D. Area cleaned	D,E,F	11		
E. Equipment stored	G	12		

APPENDIX F

FIELD TEST SITES

FIELD TEST SITES

Field Test I

Miami Agricultural School

Field Test II

Jefferson County High School
St. Petersburg Vocational-Technical Institute
Sarasota County Vocational Center
Grand Ridge High School
Pinellas Vocational Technical Institute

APPENDIX G

TABLES

TABLE ONE
ITEM ANALYSIS: GARDENING AND GROUNDSKEEPING
FORM I

ITEM NUMBER	RELATED TASKS	CORRECT OPTION	ITEM DIFFICULTY	ITEM DISCRIMINATION	ITEM PT. BISERIAL CORRELATION
1	A-1	C	0.70	0.18	0.20
2	A-1	C	0.57	0.73	0.38
3	A-2	B	0.68	0.00	0.09
4	A-3	D	0.61	-0.36	-0.21
5	A-4	B	0.59	0.27	0.21
6	A-5	C	0.68	0.18	0.03
7	A-6	A	0.36	0.09	0.06
8	A-7	B	0.57	0.45	0.24
9	A-7	B	0.57	0.09	0.12
10	A-8	B	0.64	0.45	0.36
11	A-9	B	0.48	0.36	0.30
12	A-9	A	0.52	-0.09	-0.14
13	A-10	C	0.66	0.27	0.24
14	A-11	B	0.45	0.36	0.27
15	B-12	D	0.68	-0.09	-0.08
16	B-13	D	0.50	0.00	0.05
17	B-14	B	0.57	0.27	0.33
18	B-16	B	0.55	0.09	0.21
19	B-17	D	0.50	0.36	0.15
20	B-18	D	0.48	-0.45	-0.17
21	B-20	D	0.64	-0.36	-0.25
22	B-21	B	0.64	0.73	0.49
23	B-23	D	0.66	0.09	0.05
24	B-24	C	0.68	0.55	0.37
25	B-25	B	0.73	0.09	0.09
26	B-26	D	0.27	0.27	0.06
27	C-27	A	0.32	0.18	0.27
28	C-28	B	0.64	0.27	0.27
29	C-29	C	0.48	0.09	0.15
30	C-30	C	0.64	0.09	0.09
31	C-30	B	0.68	0.18	0.24
32	C-32	C	0.80	0.09	0.05
33	C-33	B	0.57	0.18	0.18
34	C-36	B	0.55	0.00	0.13
35	C-39	B	0.64	0.27	0.21
36	C-40	B	0.39	0.73	0.48
37	D-40	B	0.68	0.27	0.32
38	D-41	B	0.59	0.36	0.32
39	D-41	B	0.61	0.18	0.24
40	D-41	D	0.55	0.18	0.11
41	D-42	C	0.75	0.45	0.35
42	D-43	C	0.57	0.45	0.35
43	D-43	D	0.23	0.18	0.30
44	D-43	C	0.57	0.64	0.36
45	D-45	C	0.55	0.27	0.24

ITEM NUMBER	RELATED TASKS	CORRECT OPTION	ITEM DIFFICULTY	ITEM DISCRIMINATION	ITEM PT. BISERIAL CORRELATION
46	D-46	A	0.52	0.18	0.23
47	D-47	A	0.43	0.27	0.22
48	D-47	C	0.61	0.00	0.25
49	D-47	A	0.39	0.36	0.32
50	D-47	B	0.45	0.18	0.17
51	D-48	C	0.27	0.45	0.38
52	D-48	B	0.48	0.45	0.36
53	D-48	B	0.50	0.55	0.41
54	D-49	D	0.41	0.64	0.43
55	D-49	C	0.48	0.09	0.12
56	D-49	A	0.64	0.27	0.29
57	D-49	C	0.68	0.45	0.37
58	D-49	B	0.68	0.09	0.32
59	D-51	B	0.39	0.45	0.30
60	D-52	A	0.48	0.27	0.22
61	D-52	B	0.55	0.27	0.35
62	D-53	A	0.25	0.55	0.36
63	D-53	A	0.41	0.45	0.33
64	D-53	C	0.50	0.45	0.26
65	D-54	D	0.57	0.27	0.34
66	D-54	C	0.48	0.45	0.33
67	D-55	B	0.41	0.18	0.26
68	D-55	C	0.50	0.55	0.42
69	D-56	A	0.30	0.09	0.17
70	E-59	B	0.55	0.27	0.25
71	E-60	B	0.75	0.27	0.38
72	E-61	A	0.45	0.27	0.29
73	E-60	A	0.36	0.45	0.38
74	E-61	C	0.57	0.73	0.51
75	E-61	D	0.41	0.00	0.09
76	E-62	D	0.41	-0.18	-0.04
77	E-62	A	0.57	0.64	0.56
78	E-63	B	0.41	0.09	0.17
79	E-63	B	0.45	0.18	0.15
80	E-63	A	0.32	0.18	0.25
81	E-64	C	0.41	0.45	0.38
82	E-64	D	0.52	-0.18	0.09
83	E-65	D	0.57	0.27	0.17
84	E-65	A	0.43	0.18	0.27
85	E-66	C	0.43	0.73	0.45
86	E-67	C	0.43	0.64	0.40
87	E-67	D	0.45	0.55	0.37
88	E-69	A	0.36	0.27	0.24
89	E-69	A	0.41	0.45	0.47
90	E-70	B	0.34	0.36	0.22
91	E-70	C	0.50	0.73	0.52
92	E-70	D	0.41	0.27	0.22
93	E-71	C	0.61	0.64	0.49
94	E-72	D	0.36	0.18	0.17
95	E-73	A	0.32	0.36	0.30

ITEM NUMBER	RELATED TASKS	CORRECT OPTION	ITEM DIFFICULTY	ITEM DISCRIMINATION	ITEM PT. BISERIAL CORRELATION
96	E-73	C	0.61	0.36	0.36
97	E-74	D	0.34	0.45	0.26
98	E-75	D	0.43	0.27	0.24
99	E-75	A	0.32	0.45	0.31
100	E-75b	C	0.34	0.18	0.29
101	F-75	D	0.48	0.36	0.30
102	F-76	B	0.59	0.73	0.58
103	F-77	C	0.55	0.36	0.37
104	F-77	A	0.52	0.36	0.45
105	F-78	B	0.59	0.64	0.54
106	F-78	A	0.59	0.55	0.52
107	F-79	C	0.52	0.55	0.51
108	F-79	C	0.59	0.45	0.39
109	F-79	B	0.57	0.82	0.53
110	F-80	D	0.41	0.09	0.09
111	F-80	C	0.39	0.18	0.26
112	F-81	A	0.59	0.55	0.45
113	F-81	C	0.50	0.64	0.48
114	F-81	D	0.57	0.27	0.28
115	F-82	A	0.50	0.45	0.35
116	F-83	B	0.57	0.91	0.61
117	F-83	B	0.45	0.18	0.27
118	F-83	B	0.50	0.91	0.55
119	F-84	D	0.30	0.18	0.17
120	F-85	A	0.64	0.55	0.52
121	F-85	C	0.61	0.64	0.55
122	F-86	B	0.43	0.45	0.40
123	F-87	B	0.57	0.73	0.53
124	F-88	B	0.48	0.55	0.41
125	F-88	C	0.61	0.45	0.53
126	F-89	B	0.45	0.55	0.39
127	F-89	D	0.57	0.55	0.38
128	F-89	A	0.55	0.45	0.55
129	F-89	C	0.55	0.64	0.49
130	F-90	C	0.34	0.18	0.17
131	F-90	D	0.45	0.27	0.30
132	F-91	C	0.70	0.64	0.59
133	F-92	D	0.41	0.27	0.33
134	F-93	B	0.52	0.73	0.53
135	F-93	D	0.34	0.55	0.38
136	F-94	A	0.55	0.55	0.55
137	F-95	D	0.45	0.73	0.50
138	F-96	D	0.45	0.45	0.30
139	F-98	B	0.39	0.36	0.36
140	F-100	A	0.20	0.18	0.26
141	F-101	D	0.52	0.64	0.51
142	F-103	C	0.27	0.36	0.36
143	F-104	A	0.50	0.64	0.44
144	F-105	A	0.36	0.55	0.34
145	F-106	B	0.36	0.45	0.33

ITEM NUMBER	RELATED TASKS	CORRECT OPTION	ITEM DIFFICULTY	ITEM DISCRIMINATION	ITEM PT. BISERIAL CORRELATION
146	F-107	A	0.45	0.55	0.47
147	F-108	B	0.43	0.55	0.41
148	F-110	C	0.36	0.64	0.43
149	F-110	B	0.30	0.18	0.30
150	F-111	C	0.50	0.55	0.49
151	F-111	B	0.16	0.27	0.27
152	G-112	D	0.36	0.45	0.31
153	G-112	C	0.57	0.64	0.58
154	G-113	C	0.50	0.27	0.28
155	G-113	C	0.30	0.09	0.15
156	G-113	B	0.41	0.73	0.48
157	G-114	A	0.32	0.36	0.30
158	G-114	B	0.43	0.64	0.46
159	G-114	B	0.43	0.36	0.22
160	G-115	B	0.32	0.45	0.30
161	G-115	D	0.41	0.82	0.52
162	G-116	B	0.36	0.45	0.33
163	G-117	A	0.18	0.00	0.08
164	G-117	D	0.45	0.55	0.45
165	G-118	C	0.34	0.18	0.27
166	G-118	A	0.41	0.45	0.30
167	G-119	C	0.32	0.45	0.42
168	G-119	A	0.48	0.64	0.47
169	G-120	B	0.34	0.36	0.36
170	G-120	A	0.32	0.45	0.36
171	G-121	D	0.18	0.27	0.20
172	H-123	A	0.48	0.55	0.49
173	H-124	C	0.39	0.36	0.25
174	H-126	C	0.36	0.36	0.40
175	H-127	B	0.39	0.45	0.35
176	H-128	A	0.43	0.36	0.39
177	H-130	B	0.27	0.18	0.28
178	H-131	D	0.36	0.09	0.09
179	H-133	D	0.52	0.64	0.53
180	H-133	A	0.20	0.36	0.29
181	H-134	D	0.55	0.64	0.51
182	H-135	C	0.41	0.27	0.32
183	H-135	B	0.50	0.55	0.42
184	H-136	C	0.30	0.45	0.39
185	H-136	A	0.43	0.55	0.38
186	H-137	C	0.41	0.27	0.27
187	H-139	D	0.55	0.64	0.44
188	H-140	B	0.48	0.45	0.34
189	H-140	C	0.34	0.27	0.24
190	H-141	D	0.48	0.36	0.35
191	H-143	B	0.23	0.73	0.42
192	H-144	D	0.30	0.18	0.19
193	H-146	D	0.45	0.64	0.50

TABLE TWO
ITEM ANALYSIS: GARDENING AND GROUNDSKEEPING
FORM II

ITEM NUMBER	RELATED TASKS	CORRECT OPTION	ITEM DIFFICULTY	ITEM DISCRIMINATION	ITEM PT. BISERIAL CORRELATION
1	A-1	C	0.70	0.18	0.20
2	A-1	C	0.57	0.73	0.38
3	A-2	B	0.68	0.00	0.09
4	A-3	D	0.61	-0.36	-0.21
5	A-4	B	0.59	0.27	0.21
6	A-5	C	0.68	0.18	0.03
7	A-6	A	0.36	0.09	0.06
8	A-7	B	0.57	0.45	0.24
9	A-7	B	0.57	0.09	0.12
10	A-8	B	0.64	0.45	0.36
11	A-9	B	0.48	0.36	0.30
12	A-9	A	0.52	-0.09	-0.14
13	A-10	C	0.66	0.27	0.24
14	A-11	B	0.45	0.36	0.27
15	B-12	D	0.68	0.09	-0.08
16	B-13	D	0.50	0.00	0.05
17	B-14	B	0.57	0.27	0.33
18	B-16	B	0.55	0.09	0.21
19	B-17	D	0.50	0.36	0.15
20	B-18	D	0.48	-0.45	-0.17
21	B-20	D	0.64	-0.36	-0.25
22	B-21	B	0.64	0.73	0.49
23	B-23	D	0.66	0.09	0.05
24	B-24	C	0.68	0.55	0.37
25	B-25	B	0.73	0.09	0.09
26	B-26	D	0.27	0.27	0.06
27	C-27	A	0.32	0.18	0.14
28	C-28	B	0.64	0.27	0.27
29	C-29	C	0.48	0.09	0.15
30	C-30	C	0.64	0.09	0.09
31	C-30	B	0.68	0.18	0.24
32	C-32	C	0.80	0.09	0.05
33	C-33	B	0.57	0.18	0.18
34	C-36	B	0.55	0.00	0.13
35	C-39	B	0.64	0.27	0.21
36	C-40	B	0.39	0.73	0.48
37	D-40	B	0.68	0.27	0.32
38	D-41	B	0.59	0.36	0.32
39	D-41	B	0.61	0.18	0.24
40	D-41	D	0.55	0.18	0.11
41	D-42	C	0.75	0.45	0.35
42	D-43	C	0.57	0.45	0.35
43	D-43	D	0.23	0.18	0.30
44	D-43	C	0.57	0.64	0.36
45	D-45	C	0.55	0.27	0.24

ITEM NUMBER	RELATED TASKS	CORRECT OPTION	ITEM DIFFICULTY	ITEM DISCRIMINATION	ITEM PT. BISERIAL CORRELATION
46	D-46	A	0.52	0.18	0.23
47	D-47	A	0.43	0.27	0.22
48	D-47	C	0.61	0.00	0.25
49	D-47	A	0.39	0.36	0.32
50	D-47	B	0.45	0.18	0.17
51	D-48	C	0.27	0.45	0.38
52	D-48	B	0.48	0.45	0.36
53	D-48	B	0.50	0.55	0.41
54	D-49	D	0.41	0.64	0.43
55	D-49	C	0.48	0.09	0.12
56	D-49	A	0.64	0.27	0.37
57	D-49	C	0.68	0.45	0.37
58	D-49	B	0.68	0.09	0.32
59	D-51	B	0.39	0.45	0.30
60	D-52	A	0.48	0.27	0.22
61	D-52	B	0.55	0.27	0.35
62	D-53	A	0.25	0.55	0.36
63	D-53	A	0.41	0.45	0.33
64	D-53	C	0.50	0.45	0.26
65	D-54	D	0.57	0.27	0.34
66	D-54	C	0.48	0.45	0.33
67	D-55	B	0.41	0.18	0.26
68	D-55	C	0.50	0.55	0.42
69	D-56	A	0.30	0.27	0.25
70	E-59	B	0.55	0.27	0.25
71	E-60	B	0.75	0.27	0.38
72	E-61	A	0.45	0.27	0.29
73	E-60	A	0.36	0.45	0.38
74	E-61	C	0.57	0.73	0.51
75	E-61	D	0.41	0.00	0.09
76	E-62	D	0.41	-0.18	-0.04
77	E-62	A	0.57	0.64	0.56
78	E-63	B	0.41	0.09	0.17
79	E-63	B	0.45	0.18	0.15
80	E-63	A	0.32	0.18	0.25
81	E-64	C	0.41	0.45	0.38
82	E-64	D	0.52	-0.18	0.09
83	E-65	D	0.57	0.27	0.17
84	E-65	A	0.43	0.18	0.27
85	E-66	C	0.43	0.73	0.45
86	E-67	C	0.43	0.64	0.40
87	E-67	D	0.45	0.55	0.37
88	E-69	A	0.36	0.27	0.24
89	E-69	A	0.41	0.45	0.47
90	E-70	B	0.34	0.36	0.22
91	E-70	C	0.50	0.73	0.52
92	E-70	D	0.41	0.27	0.22
93	E-71	C	0.61	0.64	0.49
94	E-72	D	0.36	0.18	0.17
95	E-73	A	0.32	0.36	0.30

ITEM NUMBER	RELATED TASKS	CORRECT OPTION	ITEM DIFFICULTY	ITEM DISCRIMINATION	ITEM PT. BISERIAL CORRELATION
96	E-73	C	0.61	0.36	0.36
97	E-74	D	0.34	0.45	0.26
98	E-75	D	0.43	0.27	0.24
99	E-75	A	0.32	0.45	0.31
100	E-75b	C	0.34	0.18	0.29
101	F-75	D	0.48	0.36	0.30
102	F-76	B	0.59	0.73	0.58
103	F-77	C	0.55	0.36	0.37
104	F-77	A	0.52	0.36	0.45
105	F-78	B	0.59	0.64	0.54
106	F-78	A	0.59	0.55	0.52
107	F-79	C	0.52	0.55	0.51
108	F-79	C	0.59	0.45	0.39
109	F-79	B	0.57	0.82	0.53
110	F-80	D	0.41	0.09	0.09
111	F-80	C	0.39	0.18	0.26
112	F-81	A	0.59	0.55	0.45
113	F-81	C	0.50	0.64	0.48
114	F-81	D	0.57	0.27	0.28
115	F-82	A	0.50	0.45	0.35
116	F-83	B	0.57	0.91	0.61
117	F-83	B	0.45	0.18	0.27
118	F-83	B	0.50	0.91	0.55
119	F-84	B	0.30	0.18	0.17
120	F-85	A	0.64	0.55	0.52
121	F-85	C	0.61	0.64	0.55
122	F-86	B	0.43	0.45	0.40
123	F-87	B	0.57	0.73	0.53
124	F-88	B	0.48	0.55	0.41
125	F-88	C	0.61	0.45	0.53
126	F-89	B	0.45	0.55	0.39
127	F-89	D	0.57	0.55	0.38
128	F-89	A	0.55	0.45	0.55
129	F-89	C	0.55	0.64	0.49
130	F-90	C	0.34	0.18	0.17
131	F-90	D	0.45	0.27	0.30
132	F-91	C	0.70	0.64	0.59
133	F-92	D	0.41	0.27	0.33
134	F-93	B	0.52	0.73	0.53
135	F-93	D	0.34	0.55	0.38
136	F-94	A	0.55	0.55	0.55
137	F-95	D	0.45	0.73	0.50
138	F-96	B	0.45	0.45	0.30
139	F-98	A	0.39	0.36	0.36
140	F-100	D	0.20	0.18	0.26
141	F-101	C	0.52	0.64	0.51
142	F-103	A	0.27	0.36	0.36
143	F-104	A	0.50	0.64	0.44
144	F-105	B	0.36	0.55	0.34
145	F-106	A	0.36	0.45	0.33

ITEM NUMBER	RELATED TASKS	CORRECT OPTION	ITEM DIFFICULTY	ITEM DISCRIMINATION	ITEM PT. BISERIAL CORRELATION
146	F-107	B	0.45	0.55	0.47
147	F-108	C	0.43	0.55	0.41
148	F-110	B	0.36	0.64	0.43
149	F-110	C	0.30	0.18	0.30
150	F-111	B	0.50	0.55	0.49
151	F-111	D	0.16	0.27	0.27
152	G-112	C	0.36	0.45	0.31
153	G-112	C	0.57	0.64	0.58
154	G-113	C	0.50	0.27	0.28
155	G-113	B	0.30	0.09	0.15
156	G-113	A	0.41	0.73	0.48
157	G-114	B	0.32	0.36	0.30
158	G-114	B	0.43	0.64	0.46
159	G-114	B	0.43	0.36	0.22
160	G-115	D	0.32	0.45	0.30
161	G-115	B	0.41	0.82	0.52
162	G-116	A	0.36	0.45	0.33
163	G-117	D	0.18	0.00	0.08
164	G-117	C	0.45	0.55	0.45
165	G-118	A	0.34	0.18	0.27
166	G-118	C	0.41	0.45	0.30
167	G-119	A	0.32	0.45	0.42
168	G-119	B	0.48	0.64	0.47
169	G-120	A	0.34	0.36	0.36
170	G-120	D	0.32	0.45	0.36
171	G-121	A	0.18	0.27	0.20
172	H-123	C	0.48	0.55	0.49
173	H-124	C	0.39	0.36	0.25
174	H-126	B	0.36	0.36	0.40
175	H-127	A	0.39	0.45	0.35
176	H-128	B	0.43	0.36	0.39
177	H-130	D	0.27	0.18	0.28
178	H-131	D	0.36	0.09	0.09
179	H-133	A	0.52	0.64	0.53
180	H-133	D	0.20	0.36	0.29
181	H-134	C	0.55	0.64	0.51
182	H-135	B	0.41	0.27	0.32
183	H-135	C	0.50	0.55	0.42
184	H-136	A	0.30	0.45	0.39
185	H-136	C	0.43	0.55	0.38
186	H-137	D	0.41	0.27	0.27
187	H-139	B	0.55	0.64	0.44
188	H-140	C	0.48	0.45	0.34
189	H-140	D	0.34	0.27	0.24
190	H-141	B	0.48	0.36	0.35
191	H-143	D	0.23	0.73	0.42
192	H-144	D	0.30	0.18	0.19
193	H-146	B	0.45	0.64	0.50

TABLE THREE
TEST ITEMS RELATED TO PERFORMANCE TASKS

TASK NUMBER		RELATED TEST ITEM	
		TEST A	TEST B
A	1	1,2	1
	2	3	
	3	4	2
	4	5	3
	5	6	
	6	7	4,5
	7	8,9	6
	8	10	7
	9	11,12	8
	10	13	9,10
	11	14	11
B	12	15	12
	13	16	
	14	17	13
	15		14
	16	18	15
	17	19	
	18	20	16
	19		17
	20	21	18
	21	22	
	22		19
	23	23	20
	24	24	21
	25	25	
	26	26	23
C	27	27	24
	28	28	25
	29	29	
	30	30,31	26
	31		27
	32	32	
	33	33	
	34		
	35		28
	36	34	
	37		29
	38		
	39	35	30

RELATED TEST ITEM		
TASK NUMBER	TEST A	TEST B
D 40	36,37	32,33
41	38,39,40	31,34,35,36
42	41	37
43	42,43,44	38
44		39
45	45	40
46	46	41
47	47,48,49,50	42,43,44
48	51,52,53	45,46
49	54,55,56,57,58	47,48,49,50
50		51
51	59	
52	60,61	52,53
53	62,63,64	54,55,56
54	65,66	57
55	67,68	58,59
56	69	
57		60
E 58		61
59	70	
60	71,73	63,64
61	72,74,75	62,65
62	76,77	66
63	78,79,80	67,68,69
64	81,82	70
65	83,84	71,72
66	85	73
67	86,87	74,75
68		
69	88,89	76
70	90,91,92	77,78,79
71	93	80
72	94	81,82
73	95,96	83
74	97	
75	98,99,101	84,87
75b	100	85,86,88

RELATED TEST ITEM		
TASK NUMBER	TEST A	TEST B
F 76	102	89,90
77	103,104	91,92,93
78	105,106	94,95
79	107,108,109	96,97,98
80	110,111	99,100
81	112,113,114	101,102,103,104
82	115	105,106,107
83	116,117,118	108,109,110,111
84	119	112,113,114,115,116
85	120,121	117,118,119,120
86	122	121,122,123
87	123	124,125,126
88	124,125	127,128,129,130
89	126,127,128,129	131,132
90	130,131	133
91	132	134,135
92	133	136,137
93	134,135	138
94	136	139
95	137	140
96	138	
97		141
98	139	
99		142
100	140	
101	141	143
102		144
103	142	145,146
104	143	
105	144	147
106	145	
107	146	
108	147	
109		148
110	148	
111		149
G 112	152,153	150,151,152,153
113	154,155,156	154,155
114	157,158,159	156,157
115	160,161	158,159,160
116	162	161
117	163,164	162,163,164
118	165,166	165
119	167,168	166,167
120	169,170	168,169,170
121	171	171
122		172

RELATED TEST ITEM		
TASK NUMBER	TEST A	TEST B
H 123	172	173
124	173	
125		174
126	174	175
127	175	
128	176	176
129		
130	177	177
131	178	
132		
133	179,180	178,179
134	181	180,181
135	182,183	182
136	184,185	183,184,185
137	186	
138		186
139	187	
140	188,189	187
141	190	
142		188
142	191	
144	192	
145		189
146	193	190
147	194	191
148		192
149		193

TABLE FOUR
TEST ITEMS KEYED TO BLOOM'S TAXONOMY FOR THE COGNITIVE DOMAIN

1 = Knowledge 2 = Comprehension 3 = Application 4 = Analysis			
COGNITIVE LEVEL			
ITEM NUMBER	TEST A	TEST B	
1	1	1	
2	1	1	
3	3	1	
4	1	1	
5	1	1	
6	1	1	
7	1	2	
8	1	1	
9	1	1	
10	1	2	
11	1	1	
12	1	1	
13	1	2	
14	2	1	
15	1	1	
16	1	1	
17	2	1	
18	2	1	
19	1	1	
20	1	1	
21	1	1	
22	1	2	
23	1	1	
24	1	1	
25	1	1	
26	1	1	
27	1	1	
28	1	1	
29	1	1	
30	1	2	
31	1	1	
32	1	1	
33	1	1	
34	1	1	
35	3	1	
36	2	2	
37	1	1	
38	1	1	
39	1	1	
40	2	1	

ITEM NUMBER	COGNITIVE LEVEL	
	TEST A	TEST B
41	1	1
42	2	1
43	3	1
44	1	1
45	1	1
46	2	2
47	1	3
48	1	2
49	2	1
50	1	2
51	3	1
52	3	1
53	1	1
54	2	1
55	1	1
56	2	1
57	1	1
58	1	1
59	1	1
60	1	2
61	1	1
62	1	1
63	1	1
64	2	1
65	2	1
66	1	1
67	1	1
68	1	1
69	1	1
70	2	1
71	2	1
72	2	1
73	1	1
74	1	1
75	1	1
76	1	1
77	1	1
78	2	2
79	1	1
80	2	1
81	1	1
82	1	1
83	1	1
84	1	1
85	1	1
86	1	1
87	1	1
88	1	1
89	1	1
90	1	1

ITEM NUMBER	COGNITIVE LEVEL	
	TEST A	TEST B
91	1	1
92	2	1
93	1	1
94	1	1
95	1	1
96	1	1
97	1	1
98	2	2
99	1	1
100	1	1
101	1	1
102	1	2
103	1	1
104	1	2
105	1	1
106	1	1
107	1	1
108	1	1
109	1	1
110	1	1
111	2	1
112	1	1
113	1	1
114	2	1
115	1	1
116	1	1
117	1	1
118	1	1
119	1	1
120	1	1
121	2	1
122	1	1
123	1	1
124	2	1
125	1	2
126	2	1
127	1	1
128	1	1
129	2	1
130	1	1
131	2	1
132	1	1
133	2	1
134	2	1
135	1	1
136	1	1
137	1	1
138	2	2
139	1	2
140	1	1

ITEM NUMBER	COGNITIVE LEVEL	
	TEST A	TEST B
141	1	1
142	1	1
143	1	1
144	1	1
145	2	2
146	1	2
147	1	1
148	1	1
149	1	1
150	1	1
151	1	1
152	1	1
153	1	1
154	2	1
155	2	1
156	1	1
157	2	2
158	1	1
159	1	1
160	1	1
161	1	1
162	2	1
163	1	1
164	1	1
165	2	1
166	1	2
167	2	1
168	2	1
169	1	1
170	1	1
171	2	1
172	1	1
173	2	1
174	1	1
175	1	1
176	1	2
177	1	2
178	2	1
179	2	1
180	2	1
181	2	1
182	1	1
183	1	1
184	2	1
185	1	1
186	1	1
187	1	1
188	1	1
189	1	1
190	1	1
191	1	1
192	1	1
193	1	1

TEST ITEMS KEYED TO BLOOM'S TAXONOMY FOR THE COGNITIVE DOMAIN

1 = Knowledge 2 = Comprehension 3 = Application 4 = Analysis

ITEM NUMBER	COGNITIVE LEVEL	
	TEST A	TEST B
41	1	1
42	2	1
43	3	1
44	1	1
45	1	1
46	2	2
47	1	3
48	1	2
49	2	1
50	1	2
51	3	1
52	3	1
53	1	1
54	2	1
55	1	1
56	2	1
57	1	1
58	1	1
59	1	1
60	1	2
61	1	1
62	1	1
63	1	1
64	2	1
65	2	1
66	1	1
67	1	1
68	1	1
69	1	1
70	2	1
71	2	1
72	2	1
73	1	1
74	1	1
75	1	1
76	1	1
77	1	1
78	2	2
79	1	1
80	2	1

TEST ITEMS KEYED TO BLOOM'S TAXONOMY FOR THE COGNITIVE DOMAIN

1 = Knowledge 2 = Comprehension 3 = Application 4 = Analysis

COGNITIVE LEVEL		
ITEM NUMBER	TEST A	TEST B
81	1	1
82	1	1
83	1	1
84	1	1
85	1	1
86	1	1
87	1	1
88	1	1
89	1	1
90	1	1
91	1	1
92	2	1
93	1	1
94	1	1
95	1	1
96	1	1
97	1	1
98	2	2
99	1	1
100	1	1
101	1	1
102	1	2
103	1	1
104	1	2
105	1	1
106	1	1
107	1	1
108	1	1
109	1	1
110	1	1
111	2	1
112	1	1
113	1	1
114	2	1
115	1	1
116	1	1
117	1	1
118	1	1
119	1	1
120	1	1

TEST ITEMS KEYED TO BLOOM'S TAXONOMY FOR THE COGNITIVE DOMAIN

1 = Knowledge 2 = Comprehension 3 = Application 4 = Analysis

ITEM NUMBER	COGNITIVE LEVEL	
	TEST A	TEST B
41	1	1
42	2	1
43	3	1
44	1	1
45	1	2
46	2	3
47	1	2
48	1	1
49	2	2
50	1	1
51	3	1
52	3	1
53	1	1
54	2	1
55	1	1
56	2	1
57	1	1
58	1	1
59	1	2
60	1	1
61	1	1
62	1	1
63	1	1
64	2	1
65	2	1
66	1	1
67	1	1
68	1	1
69	1	1
70	2	1
71	2	1
72	2	1
73	1	1
74	1	1
75	1	1
76	1	1
77	1	2
78	2	1
79	1	1
80	2	1

TEST ITEMS KEYED TO BLOOM'S TAXONOMY FOR THE COGNITIVE DOMAIN

1 = Knowledge 2 = Comprehension 3 = Application 4 = Analysis

ITEM NUMBER	COGNITIVE LEVEL	
	TEST A	TEST B
81	1	1
82	1	1
83	1	1
84	1	1
85	1	1
86	1	1
87	1	1
88	1	1
89	1	1
90	1	1
91	1	1
92	2	1
93	1	1
94	1	1
95	1	1
96	1	1
97	1	1
98	2	2
99	1	1
100	1	1
101	1	1
102	1	2
103	1	1
104	1	2
105	1	1
106	1	1
107	1	1
108	1	1
109	1	1
110	1	1
111	2	1
112	1	1
113	1	1
114	2	1
115	1	1
116	1	1
117	1	1
118	1	1
119	1	1
120	1	1

SUPPLEMENT A

APPENDIX H

TASK ANALYSIS

GARDENING - GROUNDSKEEPING

STUDENT OCCUPATIONAL COMPETENCY ACHIEVEMENT TESTING
ENTRY LEVEL SKILLS
GARDENING-GROUNDSKEEPING
LANDSCAPING OPERATIONS

A. ORGANIZING AND PLANNING

1. Write job descriptions for groundskeepers
2. Determine personnel requirements for groundskeepers
3. Schedule leaves or vacations
4. Plan security programs
5. Develop priority schedules for completing groundskeeping tasks
6. Establish performance standards
7. Assign tasks to groundskeeping crews
8. Develop fertilization schedules
9. Develop procedures for improving soils
10. Compile information necessary for purchasing chemicals for shrubs, trees, and lawns
11. Arrange for transportation of materials purchased

B. DIRECTING AND IMPLEMENTING

12. Develop rules and regulations
13. Develop rules for playgrounds
14. Develop work methods and procedures
15. Establish safety regulations
16. Counsel employees about absenteeism
17. Recruit employees
18. Interview and select employees
19. Perform personnel actions such as promoting an employee
20. Perform personnel actions such as firing an employee

21. Conduct or participate in staff meetings
22. Conduct or participate in staff meetings
23. Keep an inventory of plants, equipment, and supplies
24. Direct inspection activities
25. Improve work methods and procedures
26. Order replacements for plants, equipment, and supplies

C. INSPECTING/EVALUATING

27. Keep employee work records
28. Evaluate employee performance
29. Evaluate suggestions or complaints
30. Investigate accidents or incidents
31. Analyze work-load requirements
32. Evaluate layout of shop and facilities
33. Evaluate procedures for storage of items
34. Evaluate the maintenance of equipment
35. Evaluate capabilities of equipment
36. Initiate claims for deficient or damaged equipment
37. Take soil samples
38. Send soil samples for analysis
39. Read and interpret soil test analysis

D. OPERATING EQUIPMENT

40. Drive a pickup truck
42. Drive a tractor
43. Prepare soil for planting grass with rotary tiller
44. Compact a cultivated area of soil with lawn rollers

45. Apply fertilizer with centrifugal spreader
46. Apply fertilizer with drop-type hopper spreader
47. Apply a chemical with a hand sprayer
48. Calibrate tractor-mounted sprayer
49. Apply a chemical with a tractor-mounted sprayer
50. Edge a sidewalk with a power edger
51. Rake leaves with a power rake
52. Remove debris with a vacuum rake
53. Mow grass with a reel-type mower
54. Mow grass with a rotary mower
55. Cut grass with power scythe
56. Load topsoil on truck with front-end loader
57. Dig a drainage ditch with a backhoe

E. CONSTRUCTING AND MAINTAINING FACILITIES

58. Clean rest rooms
59. Clean grounds of leaves and litter
60. Construct a plant-holding arbor
61. Dispose of pesticide containers
62. Dispose of prunings
63. Construct fences
64. Revitalize sod
65. Sweep streets or parking lots
66. Repair streets
67. Repair driveways
68. Apply salt to icy sidewalks or streets
69. Repair a masonry retainer wall

70. Set stones
71. Paint lawn furniture
72. Dig drainage ditches
73. Clean drainage ditches
74. Clean ornamental pools
75. Clean and refill pools
- 75b. Repair irrigation lines and spray components

F. MAINTAINING PLANTS

76. Remove grass from flower bed edges
77. Remove weeds and grass from flower beds
78. Plant annual flowers
79. Transplant bulbs
80. Add mulch to new seedlings
81. Water plants
82. Prune shrubs
83. Prune shrubs
84. Prune and trim shrubs
85. Prune and trim trees
86. Prune hedges
87. Identify flammable chemicals
88. Store agricultural chemicals
89. Check plants for insects
90. Apply chemical treatments to diseased plants
91. Apply chemical treatment to plants infested with insects
92. Apply weed-killing compounds to lawns with a compressed-air sprayer
93. Apply weed-killing compounds to lawns
94. Transplant trees
95. Transplant trees

96. Brace newly planted trees
97. Brace newly planted trees
98. Train plants and shrubs (Espaliering)
99. Train plants and shrubs (Pleaching)
100. Build supporting structures for training vines
101. Treat cavities in trees
102. Apply tree paint to tree wounds
103. Brace overloaded limbs or branches
104. Remove stumps with a stump router
105. Remove dead or unwanted trees
106. Gird trees
107. Construct covers to protect plants from weather
108. Wrap trees or shrubs to protect from weather
109. Construct covers to protect plants from weather
110. Fill in holes or depressions in lawn
111. Sod worn spots in lawn

G. PREPARING AND IMPROVING SOIL

112. Prepare a compost
113. Apply compost
114. Prepare a seedbed for lawn areas
115. Convert subsoil to topsoil
116. Haul and spread topsoil
117. Sterilize soil with liquid soil fumigants
118. Sterilize soil with granular or powdered chemicals
119. Aerate sod
120. Apply fertilizer by the "punch bar" method

121. Control soil erosion caused by water

122. Control soil erosion caused by wind

H. MAINTAINING EQUIPMENT

123. Clean and sharpen hand tools

124. Replace handles for tools

125. Repair leaking faucets

126. Repair extension cords

127. Sharpen rotary mower cutting blade

128. Replace cutting blade on power scythe

129. Service rotary blade grinder-balancer

130. Clean centrifugal fertilizer applicators

131. Lubricate vacuum rakes

132. Lubricate centrifugal fertilizer applicators

133. Lubricate a tractor

134. Add oil in small engines

135. Change engine oil

136. Check tires for pressure, wear, and defects

137. Replace spark plugs in tractors

138. Replace breaker points on a tractor

139. Replace radiator hoses

140. Service carburetor air cleaners on small engines

141. Adjust engine idle speed on small engines

142. Service belt drives on groundskeeping equipment

143. Service chain drives on groundskeeping equipment

144. Service gear drives on groundskeeping equipment

145. Service variable speed drives on groundskeeping equipment
146. Prepare equipment for painting
147. Paint equipment
148. Clean and oil electric motors
149. Order repair parts for vehicles or other equipment

Duty: A. Organizing and Planning

Task: A1. Write Job Descriptions for Groundskeepers

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Write a job description including a 50-75 word description of each of the following tasks:	written description of grounds and equipment, pencil, paper			writing		clear descriptions of each task
a. Maintaining plants and turf grasses	horticulture reference material	Awareness of: Toxic chemicals to eye, lung and skin in- juries	horticulture soils & fertilizers, plant pathology, entomology			watering, fertilizing, pruning, controlling pests & Diseases
b. Replacing plants	horticulture reference material		horticulture, plant propagation landscape installation			mowing preparing site, determining suitable plants, planting, watering
c. Preparing and improving soil	soils reference materials		soils, chemistry			tilling, mulching, soil testing, liming, fertilizing, soil analysis
d. Maintaining facilities	maintenance reference material		mechanics			painting, building, cleaning, litter removal structural repairs
e. Operating equipment	equipment operators manuals		safety & first aid			safety considerations, efficient operation, proper operation for long life of equipment
f. Maintaining equipment	equipment operators manuals		mechanics			lubricating, tuning up maintaining tires, changing oil, cleaning store in enclosed structure

Duty: A. Organizing and Planning

Task: A2. Determine Personnel Requirements for Groundskeeping

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Determine length of time required for one person to mow an area 25 ft. x 75 ft.	written job records		measurement	writing		multiplication to determine square feet
2. Determine size of area twice as large	pencil, paper, calculator		multiplication	writing		multiplication to determine square feet
3. Calculate length of time required for three people to mow larger area	pencil, paper, calculator		multiplication division	writing		determine man-hours required for X- square feet

Duty: A. Organizing and Planning

Task: A3. Schedule Leaves or Vacations

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Review work in progress and future tasks to be performed	work schedules and records			reading		Attempt to schedule leave during off peak work seasons if possible
2. Counsel each employee requesting vacation	employee leave records, work schedules, staff list calendar		addition subtraction	speaking		review leave eligibility, discuss tasks to be performed during vacation period, determine who will perform tasks, identify alternative dates if necessary
3. Develop vacation schedule for workers	staff list, calendar			writing		identify workers by name, identify departure and return dates, identify where workers can be reached, identify by name workers responsible for tasks

Duty: A. Organizing and Planning

Task: A4. Plan Security Program

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. List possible security procedures for a grounds area, including the following:	written description of area or building			writing		
a. Personal identification system	security systems reference material			reading		review security systems and product information to determine appropriate procedures
b. Gate or door checks	"					Review grounds lay out (Blue prints) for location of security devices
c. Lighting	"					
d. Structural restraints	"					
e. Periodic police checks	"			verbal		
f. Electronic alarm and surveillance equipment	"					
g. Human or canine patrols	"	Canine bites		verbal		

Duty: A. Organizing and Planning

Task: A5. Develop Priority Scheduling for Completing Groundskeeping Tasks

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Review tasks to be performed	task list			reading		time requirements for each task
2. Review schedule form	work schedule form			reading		relative importance of each task
3. Place tasks in order of priority including alternatives for negative weather conditions	task list, work schedule form			reading writing		deadlines (if applicable) Designate the number of workers to be assigned to each job site
4. Indicate person responsible for performing each task	staff list, work schedule form			writing		capabilities of individual workers Designate equipment suitable for specific job sites
5. Indicate date of performance of each task	calendar			writing		schedule alternatives for jobs in case of staff absenteeism

Duty: A. Organizing and Planning

Task: A6. Establish Performance Standards

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. List three performance standards for applying a chemical to a fungus infection on a shrub, from the following:	pencil, paper			writing		
a. Identification of fungus	microscope, plant disease key	Awareness of chemical toxicity	plant pathology	visual interpretation		chemical must be labeled for use on plant and disease in question
b. Selection of proper chemical	fungicide labels, plant list		plant pathology, horticulture	visual interpretation		Avoid phytotoxicity of plant materials by selecting suitable chemicals
c. Determination of proper concentration	fungicide labels		multiplication division ratio-proportion			concentration, calibration and application rate must conform to standard on product label
d. Calibration of applicator	fungicide, applicator, fungicide labels, applicator manual, calculator		multiplication division mechanics measurements			
e. Application at recommended rate	fungicide labels, applicator	Awareness of chemical toxicity, skin, eye injuries			machine operation	Restricted pesticide license
f. Observation of safety precautions	fungicide label	poisoning	safety and first aid			gloves, goggles, respirator, proper clothing must be worn when working with pesticides

Duty: A. Organizing and Planning

Task: A7. Assign Tasks to Groundskeeping Crews

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Assign lawn-mowing tasks to three workers						
a. Assign equipment to each worker	mowing equipment			speaking		determine appropriate equipment based on task, worker experience
b. Designate areas to be mowed by each worker	written description or map of area		mapping or map reading	writing		divide area according to machine capacity
c. Instruct workers on safety precautions	mowing equipment, safety devices safety and first aid manual	Awareness of foot or hand injury	Safety and first aid	speaking reading		avoid mowing over foreign objects, turn off mower before removing obstructions, wear proper shoes and clothing, do not smoke while pouring fuel
d. Instruct workers in methods and procedures to be used in mowing	mowing equipment			speaking	machine operation	direction of cut, height of cut, avoid damaging trees or shrubs, disposal of clippings

Duty: A. Organizing and Planning

Task: A8. Develop Fertilization Schedule

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop a one-year schedule for applying fertilizer to shrubs, trees and lawns						
a. Review description of land-scaped area	written description of area		plant identification soils & fertilizers, turf grasses	reading		types of plants, soil types, runoff, drainage slope
b. Review soil analysis report	soil analysis report		soils, chemistry	reading		major elements, minor elements, pH, soil texture
c. Refer to fertilizer analysis and state recommendation reports	fertilizer analysis reports, fertilizer recommendations		soils, chemistry, measurement, multiplication division	reading		percent of major and minor elements, pounds per acre needed
d. List each type of plant on schedule form	schedule form		plant identification	writing		trees, shrubs, turf grass, nutrient and pH requirements of each
e. Identify the type of fertilizer and rate of application for each type of plant in the area	fertilizer analysis report fertilizer recommendations schedule form		soils, chemistry, plant nutrition, multiplication division	writing reading		nutrient requirements for various plants, pH, conversion from pounds per acre to appropriate measurement
f. Indicate approximate dates for fertilizing each type of plant	schedule form fertilizing recommendations		soils, chemistry, plant nutrition	writing		activity or speed of release of fertilizer, drainage, needs of plant Season of the year

Duty: A. Organizing and Planning

Task: A9. Develop Procedures for Improving Soils

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop procedures for improving the soil in a landscaped area having low fertility						
a. Review description of landscaped area	written description of area		knowledge of horticulture and soils	reading interpretation of data		types of plants, soil types, drainage erosion, runoff-slope
b. Review soil analysis report	soil analysis report		soils, chemistry	reading		major elements, minor elements, pH, soil texture, organic matter
c. Determine methods for improving soil	soil science reference materials		soil science, chemistry, horticulture	reading		soil physical properties - qualities desired in topsoil, - soil improvement crops (legumes) - drainage as a means of improving - adding fertilizers or mulches - irrigating soil
d. Develop procedures for each soil improvement method	soil science reference material		soil science, chemistry, horticulture	writing		incorporate organic matters - planting soil improvement crops - installing drainage mechanisms (tiles, ditches, etc.) - irrigating

Duty: A. Organizing and Planning

Task: A10. Compile Information Necessary for Purchasing Chemicals for Shrubs, Trees, and Lawns

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Compile the necessary information for purchasing liquid or granular chemicals, for shrubs, trees and lawns in a given area.						
a. Review description of landscaped area	written description of area		horticulture	reading		types of plants, soil types, drainage, runoff
b. Review chemical manufacturers reference material	pesticide reference material		chemistry, entomology, plant pathology, weed science	reading		legal uses of chemicals, appropriate plants and plant pests - insecticides - fungicides - herbicides
c. List trees, shrubs, and lawn areas on sheet	written description of area		plant identification	writing visual identification		Read label to avoid any toxic response genus species, number or acreage of each
d. Review literature regarding plant pests, control methods, and application rates for plants in area	plant pest bulletins or references, pesticide recommendations, pesticide application references Cooperative Extension Service	chemical toxicity	chemistry, entomology, plant pathology, weed science, plant identification, ration-proportion, volumetric measurement	reading		appropriate uses, rates, safety consideration Awareness of chemical toxicity
(cont.)			First Aid Safety			

Duty: A. Organizing and Planning

Task: A10. Compile Information Necessary for Purchasing Chemicals for Shrubs, Trees, and Lawns (cont.)

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
e. List chemical type and application rate for each plant	plant pest bulletins or references, pesticide recommendations, pesticide application references Cooperative Ext. Service	Awareness of chemical toxicity	chemistry, entomology, plant pathology, weed science	writing		rates must conform to restrictions on label and state recommendations Observe phyto - toxic
f. List chemicals to be purchased for each purpose	pesticide recommendations pesticide reference material		chemistry, entomology, plant pathology, weed science	writing visual interpretation		brand name, quantity, name and location of supplier
g. Compute costs for each chemical purchased and list tools	chemical price lists, calculator		addition multiplication	operation of calculator general math proportions percentages		- insecticides - fungicides - herbicides - total

Duty: A. Organizing and Planning

Task: All. Arrange for Transportation of Materials Purchased

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Arrange to have trees and shrubs transported from a nursery to a holding shed						
a. Review list of items purchased	written list of plants Florida Grades and Standards		horticulture, plant identification	reading		consider special needs of certain plants
b. Assign task to worker	manual worker, vehicle, invoice			speaking		select most appropriate worker: driving skills, map reading ability, knowledge of plants
c. Instruct worker for inspecting and transporting purchased items	worker, vehicle, invoice, map, plants, sales receipts		horticulture, map reading, interpreting invoice and receipts	speaking reading		- vehicle to be used in transporting plants - route to and from nursery - pick up plant at nursery. - examining and separating unhealthy plants - sales receipts to be retained - procedure for loading and unloading plants
d. Inspect plants for dehydration and/or damage	plants		horticulture, plant physiology plant identification			inspect for - leaf damage - stem damage - limb damage - root damage - dehydration - soil loss

Duty: B. Directing and Implementing

Task: B12. Develop Rules and Regulations

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop a set of 20 personnel policy rules covering at least 10 of the following:						
a. parking	written description of company facilities, personnel, and business activities personnel policy references			writing		rules must be clearly stated, concise
b. personal conduct				reading		
c. personal property						
d. telephone calls						
e. bulletin boards						
f. solicitation						
g. complaints-grievance policy & procedure						
h. wages and compensation						
i. overtime						
j. raises						
k. leave of absence						
l. vacation						
m. holidays						
n. jury duty						
o restroom facilities						
q. breaks & lunch						
r. accidents						

Duty: B. Directing and Implementing

Task: B12. Develop Rules and Regulations (cont.)

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
s. absenteeism						
t. first aid	written description of company facilities, personnel, and business activities		First Aid Safety	writing reading		rules must be clearly stated, concise
u. tools and equipment						
v. safety & the use of safety devices. (respirator)						
w. health						
x. dress	personnel policy references					
- Staff meetings						
Insurance: Health Life						
- Professional Improvement Courses						
- Travel Expenses						
- Required Certifications (i.e. Pesticide License)	pesticide application manual		Pesticide Application			
- Firing Policy						
- Promotions						
- Attendance Policy						
- Tardiness						
- Work Evaluation						

Duty: B. Directing and Implementing

Task: B13. Develop Rules for Playgrounds

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop a list of eight rules for a playground, including two rules covering each of the following: a. hazardous play b. proper use of equipment c. safety rules d. boundaries for recreational activities Special Restrictions to include: Pool use (if any) Food & Beverages Pets Hours & Days open Admission Fee	written description of playground, equipment and types of activities		Safety & First Aid	reading writing		rules must be clearly stated rules must be reasonable and enforceable Clearly Posted

Duty: B. Directing and Implementing

Task: B14. Develop Work Methods and Procedures

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop an alternative method for performing a groundskeeping task.						
a. State problem associated with old method.	written description of method, record books, calculator		problem solving, cost estimation, record keeping	questioning writing speaking		excessive labor excessive cost, excessive time, ineffective, poor quality results, wasteful
b. State causes of problems	written description of method, record books, calculator		problem solving, accounting, record keeping	writing speaking		wrong materials, wrong machinery, poor use of time, wasteful use of materials, ineffective methods, labor intensive
c. Develop new plan or procedure for improving task performance	reference material related to task, calculator, price list for materials		horticulture, cost estimation, addition subtraction, record keeping	writing speaking		different materials or machinery, better use of employee time, conservation of materials, more effective methods
d. Test new plan or procedure and compare cost with old method	groundskeeping materials, record books, calculator		accounting, record keeping	questioning writing		keep careful records for objective comparison
e. Revise new plan as necessary	record books, reference materials		problem solving, record keeping	writing speaking		review each step of procedure
f. Implement new plan	groundskeeping materials, written description of new methods, record books			writing speaking		put plan in writing, instruct workers in new procedure keep records over time to insure long range savings

Duty: B. Directing and Implementing

Task: B15. Establish Safety Regulations

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop a list of safety regulations for operating a reel-type mower covering the following:			Safety & First Aid			
a. Fueling motor	mower operators manual			writing		- no smoking while pouring fuel - avoid spilling fuel - avoid skin contact with fuel - pour in a well ventilated area - allow engine to cool before refueling
b. Safety check	mower operators manual			writing		- make sure all shields, guards are in place - nuts, bolts, cables secured
c. Removal of foreign objects from area	mower operators manual			writing		- pick up stones, sticks, any other debris from area
d. Starting mower	mower operators manual			writing		- follow procedures in operators manual precisely
e. Operating mower	mower operators manual			writing		- follow procedures in manual precisely
f. Safety equipment and clothing	mower operators manual			writing		- eye protection - leather shoes or boots - special procedures for moving on steep embankments

Duty: B. Directing and Implementing

Task: B16. Counsel Employees about Absenteeism

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Analyze employee attendance and performance records	employee records		addition subtraction	reading		- look for trend in absenteeism - calculate leave time - review on-the-job performance
2. Discuss employee interests and attitudes confidentially with other supervisors	employee records			speaking, management		- look for trend in absenteeism
3. Arrange for private meeting room	calendar room schedule			speaking, scheduling, management		- schedule meeting for minimum interference with work schedule
4. Call employee for conference	telephone calendar			speaking, scheduling, management		- time of meeting - place - reason for meeting
5. Set stage for informal discussion	employee records			speaking, diplomacy		- start informally with small talk - recognize contributions or achievements made by worker - emphasize importance of work
6. Pre-explain attendance policy						
7. Inquire about reasons for absenteeism	employee records			speaking, questioning, diplomacy		- show records - discuss dates in question
8. Ask worker to conform to policy	written company policy		calculate leave time	speaking, management, diplomacy speaking, management, diplomacy		- excused absences - unexcused absences - planned leave or vacation - importance of conforming to policy - consequences of excessive absenteeism

Duty: B. Directing and Implementing

Task: B17. Recruit Employees

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Identify at least 8 of the following methods or sources which could be used for recruiting personnel	pen, pencil recruitment references			writing advertising verbal		- knowledge of laws regarding recruiting and hiring - company recruiting and hiring policy. - specific employment needs of company
a. field applications						
b. verbal communication to existing workers						
c. employee service						
d. radio						
e. television						
f. newspapers						
g. verbal communication in the community						
h. inquiries with similar businesses						
i. employment agencies						
j. posted signs						
k. Universities Colleges						

Duty: B. Directing and Implementing

Task: B18. Interview and Select Employees

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Determine which one of the three applicants is most qualified for a job opening	job description job applications					- job description - job application - interviews
a. Review work to be performed	job description		knowledge of job requirements, horticulture, mechanics, etc.	reading		- determine skills, qualifications needed to perform job
b. Review applications	job applications			reading		- work experience - education-Job knowledge - interests - neatness
c. Discuss applicant's work experience with former employers	telephone job description job applications			speaking questioning		- attitude toward work - reliability - experience - compatibility with others - works independently - self starter - quality & quantity of work
d. Arrange interview with each applicant	calendar, telephone, job applications		scheduling	speaking		
e. Interview each applicant	job description job applications note pad			speaking questioning writing		- reason for seeking job - past work experience - discuss job opening and its importance - relate job to applicant's experience - describe working conditions - describe fringe benefits - advancement opportunities - salary - discuss personnel policy

(cont.)

Duty: B. Directing and Implementing

Task: B18. Interview and Select Employees (cont.)

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
f. Assess qualifications of each applicant	job description job applications interview notes			reading questioning		- objective comparison - follow state and federal hiring guidelines
g. Select most qualified applicant				reading		- interest in job - related experience - related training - work record - potentials for advancement

Duty: B. Directing and Implementing

Task: B19. Perform Personnel Actions such as Promoting an Employee

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop a work evaluation system which could be used for both promotions & firing or retaining workers						
a. seniority	employee records position description		addition	reading		- company policy - state and federal guidelines
b. experience	employee records resume, application			reading		- present job - past jobs
c. past work performance	employee records			reading		- present job - past jobs
d. education and training	employee records resume, application			reading		- related to job - unrelated to job
e. Desire for future growth	employee records			reading questioning		- personal observations - interview employee - inquire with other supervisors
f. ability to get along with others	employee records			reading questioning		- personal observations - inquire with co-workers
g. ability to adapt	employee records			reading questioning		- personal observations - inquire with supervisors
h. general attitude						
i. job knowledge - ability to work independently - self starter - dependability - attendance	employee records			reading questioning		- personal observation - interview employee - inquire with other supervisors

Duty: B. Directing and Implementing -

Task: B20. Perform Personnel Actions Such as Firing an Employee

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. List at least 8 of the following reasons for firing an employee:	job descriptions written company policy, employee records					decision must be objective, based on reliable evidence
a. intoxication on the job				reading questioning		avoid hear-say or prejudiced accusations
b. excessive tardiness	"					
c. excessive or unreasonable absences	"			"		"
d. poor work performance (quality & quantity)	"			"		"
e. extreme carelessness	"			"		"
f. inability/refusal to follow orders	"			"		"
g. theft of company or personal property	"			"		"
h. deliberate abuse or destruction of equipment	"			"		"
i. inability to get along with others	"			"		"
j. inciting arguments or violence among workers	"			"		"
k. extremely poor attitude toward job	"			"		"
- insubordination						
- failure to comply with Personnel Policies (B-12)						

Duty: B. Directing and Implementing

Task: B21. Conducting or Participate in Staff Meeting

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop a list of sequential steps for conducting a staff meeting including the following:						
a. Determine need for meeting	work records, work schedules			reading planning		
b. Select meeting time	work schedules calendar			scheduling reading		
c. Arrange for meeting place	work schedules calendar			speaking scheduling reading		
d. Secure needed equipment	equipment list			scheduling speaking		
e. Select topics	work records, work schedules		research skills	reading planning		
f. Collect information	work records, work schedules		research skills	reading planning		
g. Organize information	meeting agenda written information			reading planning		
h. Present information	meeting agenda written information, appropriate equipment			speaking reading		
i. Permit time for general input by staff	note pad			speaking questioning writing		
j. Evaluate meeting	evaluation forms		research skills	speaking questioning writing		

Duty: B. Directing and Implementing

Task: B22. Conduct or Participate in Staff Meetings

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Conduct a staff meeting to describe work to be completed						
a. Write information required for performing task	writing materials work schedule			writing		- procedures required - finished work standards for judging performance - safety precautions
b. Assign task responsibilities to each worker	writing material work schedule			delegating		- select appropriate worker according to skills, experience
c. Present information needed by each worker to complete task	written description of task, list of tools and materials			speaking		- give all needed information - stress safety precaution - allow time for questions
d. Check worker understanding	written description of task, list of tools and materials			questioning		- ask worker to repeat key instructions - entertain general question pertinent to task

Duty: B. Directing and Implementing

Task: B23. Keep an Inventory of Plants, Equipment and Supplies

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Maintain for one month an accurate inventory of all items in stock						
a. Review the system for purchasing & supply checkout	written company policy, purchasing records		addition subtraction multiplication	writing		- look at past records - sales trends
b. Revise system for improving efficiency and reducing costs if possible	purchasing and sales records, price lists, order forms		addition subtraction comparing costs	writing		- quantities purchased - items purchased - sales records - possible savings
c. Record daily items checks out and items purchased	record books, inventory lists, purchasing records		record keeping addition subtraction	writing		- precise record keeping - time, date, amounts of each transaction
d. Check items in stock at end of each week	inventory lists record books		record keeping addition subtraction	writing		- organize stock - compare to sales receipts and records
e. After one month, total inventory and order needed items	inventory lists record books, price lists, order forms		addition subtraction	writing		- organize stock - compare to sales receipts and records - calculate purchasing needs - look for trends in sales volume

Duty: B. Directing and Implementing

Task: B24. Direct Inspection Activities

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop a list of inspection points to evaluate work performed in a designated gardening task: including at least 3 of the following:	written description of gardening task written description of area		horticulture soil science	writing		
a. Does soil have proper moisture?	hydrometer		horticulture soil science	writing	use of hydrometer	- determine proper soil moisture for type of soil and plants
b. Is soil properly mixed with growth stimulants?	tillage tools, shovel, rake, tractor, harrow	cuts from tools	chemistry soil science	writing	soil tillage	- organic matter - lime - fertilizers - well mixed to 6" depth
c. Is planting hole large enough to accomodate plant roots?	shovel, yardstick	cuts from tools	horticulture measurements	writing	digging	- proper depth - proper diameter
d. Should roots be separated before planting?	horticultural reference manual		horticulture	writing	root separation	- avoid damaging roots
e. Should spading device be used for new plant?	screening, wood or PVC		horticulture construction	writing	construction of shade structure	- determine needs of plant - consider natural shade

Duty: B. Directing and Implementing

Task: B25. Improve Work Methods and Procedures

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop a set of recommendations for improving work methods in mowing a lawn achieving at least 4 of the following:	written description of mowing task, equipment and area to be mowed, mower operators manual			writing		
a. Reduce work time			calculating area	writing		- pattern of cutting - speed of travel
b. Consume less fuel or energy			calculating fuel use per unit area	writing		- pattern of cutting - tune engine - reduce idle time - sharpen blades
c. Use less effort			mechanics mechanics	writing		- pattern of cutting - sharpen blades
d. Improve lawn appearance or condition			mechanics horticulture	writing		- sharpen blades - adjust cutting height
e. Improve safety conditions			mechanics	writing		- proper clothing - shields, guards in place - foreign objects removed
f. Improve equipment care			mechanics	writing		- tune up - oil change - oil and air filter replacement - clean up
g. Reduce air and noise pollution			mechanics	writing		- tune up - carburetor adjustment - service exhaust system

Duty: B. Directing and Implementing

Task: B26. Order Replacements for Plants, Equipment and Supplies

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Order replacements for exhausted stocks of plants, equipment and supplies:						
a. Determine item quantities required	inventory lists work schedules job descriptions		addition subtraction	reading writing		
b. Analyze current inventory for item shortages	inventory lists		addition subtraction	reading writing		
c. List items to be purchased	order forms catalogs			writing		- brand names - item quantities - potential suppliers
d. Compare cost and quality among different suppliers	price lists calculator		addition subtraction fractions percentages	reading writing		
e. Compute purchase costs for items	calculator price lists		addition subtraction multiplication	writing		
f. Review purchase costs with supervisor	price lists catalogs		addition subtraction percentages	speaking		
g. Order items from suppliers	order forms catalogs		addition subtraction multiplication percentages	writing		

Duty: C . Inspecting/Evaluating

Task: C 27. Keep Employee Work Records

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Keep work records on employees for one month						
a. Collect time cards	employee time cards					
b. Record hours worked	record book calculator		addition subtraction	writing		
c. Record hours absent	record book		addition subtraction	writing		
d. Update leave records	employee leave records		addition subtraction	writing		

Duty: C. Inspecting/Evaluating

Task: C28. Evaluate Employee Performance

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. List 5 questions that should be used in evaluating an employee's performance of a groundskeeping task: a. Was the task neatly done? b. Were safety rules observed? c. Was the task completed in a reasonable length of time? d. Were the proper tools selected and used properly? e. Were standard horticultural or groundskeeping practices followed?	written description of groundskeeping task		horticulture	writing		

Duty: C. Inspecting and Evaluating

Task: C29. Evaluate Suggestions or Complaints

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop 6 questions to be used in evaluating suggestions for improving the way a task is performed: a. Is the suggestion based on logic? b. Has it been done elsewhere? c. Is it feasible within existing conditions? d. Do others agree with the suggestion? e. Would it detract from the present function of the area? f. Can it be tried with a minimum of expense?	written description of task, suggestions for improving procedures		horticulture	writing questioning		

Duty: C. Inspecting/Evaluating

Task: C30. Investigate Accidents or Incidents

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. List steps to be taken in investigating an accident, including the following:	written or oral description of accident, resulting damage, and conditions under which it occurred					
a. Question injured worker				speaking questioning		- What happened? - How did it happen?
b. Question other workers present				speaking questioning		- What happened? - How did it happen?
c. Inspect equipment			mechanics			- Was accident caused by faulty equipment?
d. Evaluate conditions under which accident occurred			mechanics			- Were safety precautions followed? - Was accident caused by human error?
e. Recheck information						
f. Formulate conclusions			problem solving			- What caused the accident? - How can similar accidents be prevented?

Duty: C. Inspecting/Evaluating

Task: C31. Analyze Work-Load Requirements

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. List at least 5 of the following factors that should be considered when analyzing employees work loads for a designated period:	employee time cards, work records, job descriptions			reading writing		- Is work load distributed effectively? - Is time used efficiently? - Can work load be distributed better to improve performance?
a. Title of each duty						
b. Approximate time of each duty						
c. Number of hours worked			addition subtraction			
d. Number of duties performed						
e. Rating of difficulty of each duty performed						
f. Number of assistants on each duty						
g. Evaluation of each duty						

Duty: C. Inspecting/Evaluating

Task: C32. Evaluate Layout of Shop Facilities

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop a list of at least 7 of the following criteria to be used in evaluating the layout of a shop and facilities:	shop plans, written description of equipment and facilities, written description of types of work to be performed in shop			reading writing		- use of shop facilities - number of people using facilities - long term plans
a. Overall design			shop skills mechanics			
b. Adequate space			calculating area			
c. Efficient space			calculating area			
d. Neatness			shop skills mechanics			
e. Cleanliness			shop skills mechanics			
f. Adequate ventilation			shop skills mechanics			
g. Ample lighting			shop skills mechanics			
h. Ease of modification			shop skills mechanics			
i. Adequate safety features			shop skills mechanics			

Duty: C. Inspecting/Evaluating

Task: C33. Evaluate Procedures for Storage of Items

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop a list of questions to be used in evaluating a set of storage procedures, including the following: a. Is space well utilized? b. Are items easily accessible? c. Are items stored in an orderly fashion? d. Are safety considerations evident? e. Does the system lend itself to inventory?	written description of storage procedures		addition subtraction calculation of area			

Duty: C: Inspecting/Evaluating

Task: C34: Evaluate the Maintenance of Equipment

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Determine if service and maintenance work on a mower has been performed as recommended by the manufacturer.						- Were service schedules kept up to date? - Were repairs done to proper specifications and using proper parts? - Were service records kept accurately?
a. Review manufacturer's service manual	manufacturer's service/operation manual for mower		addition, subtraction, calculate hours of operation, scheduling	reading, interpret service schedules and specifications		
b. Review service records	service and repair records for mower		addition, subtraction, calculate hours of operation, scheduling	reading, interpret service schedules and specifications		
c. Compare service records with manufacturer's recommendations	service and repair records for mower		addition, subtraction, calculate hours of operation, scheduling	reading, interpret service schedules and specifications		

Duty: C: Inspecting/Evaluating

Task: C35: Evaluate Capabilities of Equipment

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Develop a list of factors to be considered in evaluating the capabilities of a used reel-type mower including at least 10 of the following:	owner/operator manual, written description of anticipated use		engine mechanics, groundskeeping, mower operation	reading, interpreting technical information		
a. Size (width of cut)						
b. Weight						
c. Operating speed						
d. Ease of handling						
e. Amount of previous use						
f. Average life of equipment						
g. Service record						
h. Amount of wear						
i. Mechanical inspection						
j. Past repair records						
k. Strength of construction						
1. Difficulty of jobs for which mower was designed	(cont.)					

Duty: C: Inspecting/Evaluating

Task: C35: Evaluate Capabilities of Equipment (cont.)

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
m. Recommendations from an experienced repairperson or dealer						
n. Manufacturers recommended uses						
210						211

Duty: C. Inspecting/Evaluating

Task: C36: Initiate Claims for Deficient or Damaged Equipment

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Complete insurance damage claim form for a piece of damaged equipment.						
a. determine extent of damage	written summary of damage		mechanical knowledge	reading damage reports		- obtain number of damage estimates required by insurance company
b. determine cost of repairs	damage repair estimate		addition subtraction	reading estimates		
c. determine amount of lost work time due to damage	work schedules		addition subtraction	reading schedules		
d. fill in needed information on form	insurance claim forms		percentages	writing		- accurately compile all information required on claim forms

Duty: C. Inspecting/Evaluating

Task: C37: Take Soil Samples

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Identify field to be sampled	farm maps		map reading			- location of field - size of field - type of plants in field
2. Map individual sample sites	lab sheets, farm maps		map making, estimating distances			- determine number of samples needed from field - avoid sampling low spots, row ends, unrepresentative locations
3. Fill out laboratory information sheet and mark container	lab sheets, soil bags		sampling techniques	writing lab information		- location of sampling site - crop or land use information - return address - testing fees
4. Take the soil samples			sampling techniques		Using a soil probe or shovel	
a. Determine proper depth						- uniform depth and sampling technique
b. Use soil probe or shovel to take a collective sample	soil probe or shovel, bucket, soil bags	cuts from soil probe or shovel	sampling techniques			- representative sample
c. Mix collective sample			sampling techniques		mixing sample	- mix collective sample well
d. Take a sample of collective sample			sampling techniques			- clean probe between samples
e. Clean soil probe between samples			sampling techniques			- clearly identify each sample

Duty: C. Inspecting/Evaluating

Task: C38: Send Soil Samples for Analysis

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Send soil samples for analysis						
a. fill in all necessary information on laboratory form	soil testing laboratory information sheets			writing sample information		- include all information requested by lab
b. clearly label each sample	soil samples, sample bags, marking pen		sampling skills	labeling samples		- use marking pen, permanent ink - record labeling code for personal records
c. package samples according to laboratory directions	mailing package				wrapping, taping samples	- wrap securely
d. Mail sample	postal scales, postage stamps		determine postage rate		operate postal scales	- include complete return address - proper postage

Duty: C. Inspecting/Evaluating

Task: C38. Read and Interpret Soil Test Analysis

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Interpret soil test report	soil test report		soil science, chemistry, conversions, ratios	reading soil test report		- determine any deficiencies or toxic levels
a. Major elements						
b. Minor elements						
c. pH						
2. Determine necessary soil amendments to improve fertility	soil test report, fertilizer labels		soil science, chemistry, conversions, ratios	reading soil test report, reading fertilizer labels		- proposed soil use - physical characteristics of soil - fertilizer analysis (N P K, minor elements) - follow soil testing lab or extension service recommendations
a. Determine what elements are deficient						
b. Calculate pounds per acre of each element needed						
c. Determine appropriate fertilizer						
d. Calculate amount of fertilizer needed to bring nutrients up to desired level						
e. Determine amount of lime needed to raise soil to proper pH						

Duty: D. Operating Equipment

Task: D40: Drive a Pickup Truck

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Drive a pickup truck	pickup truck operators manual	crashes, collisions				
a. adjust seat					operating seat adjustments	
b. fasten safety belt					operating safety belt	
c. check lights, horn, brakes, mirrors and other safety devices					operating safety devices	
d. Shift into neutral gear or "park" position if automatic transmission					shifting gears	
e. start engine					operating ignition	
f. drive the truck through designated area				reading road signs	steering vehicle, shifting gears, braking	- obey all traffic laws

Duty: D. Operating Equipment

Task: D41. Drive a Tractor

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Perform pre-operational safety check	tractor, operators manual				operation of safety devices	- use operators manual or safety checklist
a. shields and guards						
b. lights						
c. tire inflation						
d. fire extinguisher						
e. ballast (weights)						
2. Start tractor						
a. well ventilated area	tractor, operators manual	injury from PTO shaft			shifting gears, operating ignition	- place all controls in neutral - observe all safety rules.
b. shift into neutral						
c. disengage PTO						
3. Drive tractor						
a. select proper gear	tractor, operators manual	injury from collisions, rollover			shifting gears, steering tractor	- lock brakes together for highway operation - use brakes independently for highway operation - use extreme caution when operating on a slope - use SMV sign for highway operation
b. accelerate slowly and evenly						

Duty: D. Operating Equipment

Task: D42: Prepare Soil for Planting with Rotary Tiller

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Use a rotary tiller to prepare soil for planting	rotary tiller, operators manual					
a. perform any needed preliminary maintenance as specified by manual			mechanical ability	reading operators manual	machine operation	- check all safety features
b. set tilth and check stabilizer bars or chains if applicable			mechanical ability	reading operators manual	machine operation	- adjust according to manual
c. start engine		cuts from rotary blades		reading operators manual	starting engine	- be sure that rotors are disengaged while starting - wear heavy boots while operating tiller
d. determine starting point and path of travel		cuts from rotary blades		reading operators manual	machine operation	- operate in a straight line
e. engage rotors		cuts from rotary blades		reading operators manual	machine operation	- be sure that area is free of foreign objects
f. lower rotors at starting point		cuts from rotary blades		reading operators manual	machine operation	- lower rotors slowly - keep hands and feet away from rotors
g. set throttle and allow tiller to set travel speed		cuts from rotary blades		reading operators manual	machine operation	- observe all safety precautions

Duty: D. Operating Equipment

Task: D43: Sow Seed with Hand Seeder

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Sow grass seed over a prepared area using a hand seeder						
a. determine boundaries to be sown	tape measure		measurements, calculating area	read measurements	measuring	- clearly mark boundaries
b. set seeder rate gate (calibrate seeder)	hand seeder, operating instructions		calibration, conversions		setting seeding rate	- determine and recheck seeding rate setting
c. determine starting point and rate of travel	hand seeder, operating instructions					- travel in a straight line - slight overlap with each pass
d. begin walking at normal pace and turn handle to distribute seed	hand seeder, grass seed		turf grass science		operating seeder	- walk at steady pace - turn handle at uniform rate

Duty: D. Operating Equipment

Task: D44: Compact a Cultivated Area of Soil with Lawn Rollers

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Compact an area of cultivated soil using a lawn roller						
a. determine level to fill roller	machine manual		turf grass science	reading operators manual	filling roller	- soil type - size of roller - degree of compaction needed
b. fill the roller with water	lawn roller water source		turf grass science			
c. determine starting point and path of travel			turf grass science			- straight line of travel
d. guide roller over the area		injuries to feet and legs from roller	turf grass science		operating roller	- uniformity - overlap 12 inches on each pass
e. repeat in opposite or crosswise direction			turf grass science			

Duty: D. Operating Equipment

Task: D45: Apply Fertilizer with Centrifugal Spreader

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Apply fertilizer over an area using a centrifugal spreader						
a. check operators manual for instructions	operators manual			reading operators manual		
b. determine spreader setting for desired rate per area	operators manual, centrifugal spreader		general math, conversions, ratios	reading manual, fertilizer labels	setting spreader rate	- recommended rate - fertilizer analysis - size of area
c. close rate gates	centrifugal spreader				operating rate gates	
d. fill hopper with fertilizer	fertilizer, centrifugal spreader	eye, skin or respiratory irritation from fertilizer dust	knowledge of fertilizers & fertilization		filling hopper	
e. determine path of travel for uniform application	fertilizer, centrifugal spreader					- straight, uniform path of travel
f. open gate after machine is in motion	fertilizer, centrifugal spreader				operating spreader	
g. walk over the field, operating the spreader	fertilizer, centrifugal spreader				operating spreader	- steady, even pace - slight overlap with each pass

Duty: D. Operating Equipment

Task: D46: Apply Fertilizer with Drop-Type Hopper Spreader

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Apply fertilizer to an area using a drop-type hopper spreader						
a. check manual for operating instructions	operators manual			reading operators manual		
b. determine spreader setting for rate per area	operators manual, drop-type spreader		general math, conversions	reading manual, fertilizer labels	calibrating spreader	- recommended rate - fertilizer analysis - size of area
c. close rate gates	drop-type spreader				operating rate gates	
d. fill hopper with fertilizer	fertilizer, drop-type spreader	eye, skin or respiratory irritation from fertilizer dust	knowledge of fertilizers & fertilization		filling hopper	
e. determine path of travel for uniform application	fertilizer, drop-type spreader					- straight, uniform path of travel
f. open rate gate after machine is in motion	fertilizer, drop-type spreader				operating spreader	
g. walk across area, operating spreader	fertilizer, drop-type spreader				operating spreader	- steady, even pace - slight overlap with each pass

Duty: D; Operating Equipment

Task: D47: Apply a Chemical with a Hand Sprayer

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Spray insect infected plants using a hand sprayer						
a. remove or cover water or food sources in area	plastic sheets	poisoning			using drop cloths	- consider wind drift
b. read chemical labels completely	pesticide labels	poisoning	chemistry, entomology, ratios, proportions	read and interpret chemical labels		- plants pesticide is labeled for - pests pesticide is labeled for - recommended rates
c. observe all safety precautions listed for pesticide	pesticide labels, rubber gloves, respirator, goggles	poisoning	chemistry	read and interpret chemical labels	filling sprayer	- proper clothing - goggles - gloves
d. partially fill sprayer with water	sprayer, water source	poisoning	measurements			
e. determine amount of pesticide needed	pesticide labels, pest control recommendations	poisoning	chemistry, ratios, proportions, measurements		filling sprayer	- careful, precise measurement
f. add pesticide to sprayer	pesticide, sprayer	skin or eye irritation, poisoning	chemistry, ratios, proportions, measurements		filling sprayer	- minimize splashing
g. add water until sprayer is filled	sprayer, water source	skin or eye irritation, poisoning	chemistry, ratios, proportions, measurement		filling sprayer	- minimize splashing
(cont.) 234						235

Duty: D. Operating Equipment

Task: D47: Apply a Chemical with a Hand Sprayer (cont.)

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
h. thoroughly mix solution	sprayer, mixing tool	skin or eye irritation, poisoning	chemistry, ratios, proportions, measurements		mixing solution	- minimize splashing
i. pressurize sprayer	sprayer	skin or eye irritation, poisoning	fluid pressures	read pressure gauge	pumping sprayer	- recommended pressure
j. Adjust nozzle	sprayer	skin or eye irritation, poisoning	fluid pressures		turning nozzle	- uniform coverage of plant surfaces
k. spray affected area	sprayer	skin or eye irritation, poisoning	entomology		operating sprayer	- steady, uniform spray pattern

Duty: D. Operating Equipment

Task: D48. Calibrate Tractor Mounted-Sprayer

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Calibrate a tractor-mounted herbicide sprayer						
a. fill sprayer with water	herbicide sprayer, water hose				filling sprayer	
b. select appropriate tractor speed and pump pressure	tractor, sprayer		tractor operation	reading speedometer, pressure gauge	tractor driving	- recommended speed for sprayer operation - nozzle type - crop and weed types
c. select appropriate nozzle	spray nozzles		weed science, ag machinery			- chemical to be used - crop and weed types - maturity of crop and weeds - operating pressure
d. measure and mark a specific distance of travel	tape measure		linear measurement	reading tape measure	using tape measure	- choose distance easily converted (ie.1/50acre) .
e. measure the time needed for tractor to travel measured distance at a selected constant speed	stopwatch, tractor	cuts, bruises from tractor	time measurement, tractor operation	reading watch	operate stopwatch	- same speed at which spraying is to be done
f. with pump running at selected constant pressure, collect spray for the time needed to travel the measured distance	collection buckets, tractor, sprayer	cuts, bruises from PTO	tractor operation, sprayer operation, time measurement		sprayer operation collecting spray	- collect from two or more nozzles - measure total and determine average amount from each nozzle
(cont.)						

Duty: D. Operating Equipment

Task: D48: Calibrate Tractor-Mounted Sprayer (cont.)

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
g. determine amount of material sprayed and convert to gallons	volume measuring containers, conversion tables		volume measurement, multiplication, conversions	reading measurements		- average amount per nozzle X number of nozzles
h. calculate area sprayed in acres	calculator		ratios, conversions, multiplication division			- boom width X distance traveled, divided by 43,560 ft ² / acre
i. calculate amount of material sprayed on one acre	calculator		ratios, conversions, multiplication division			- amount sprayed on calibration plot divided by number of acres in calibration plot

Duty: D. Operating Equipment

Task: D49. Apply a Chemical with a Tractor Mounted Sprayer

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Spray a lawn with insecticide using a tractor mounted sprayer.						
a. Remove or cover water containers or food sources in the area	plastic drop cloths		chemistry		using dropcloths	
b. read chemical labels completely	pesticide labels		chemistry, entomology, ratios, conversions	reading chemical labels	filling tank	- type of pests - type of plants - recommended dose - precautions
c. partially fill sprayer with water	sprayer, water hose		chemistry, entomology, ratios, conversions			
d. determine amount of pesticide needed	calculator, pesticide labels		sprayer calibration, chemistry, ratios, entomology, calibration	reading chemical labels		- see D49: Calibration
e. add chemical to sprayer	pesticide, sprayer, gloves aspirator	poisoning, skin or eye irritation	volume measurement	reading chemical labels	measuring and pouring chemicals without splashing	- measure precisely - pour carefully, avoid splashing
f. add surfactant if needed	chemical surfactant, gloves, aspirator	poisoning, skin or eye irritation	ratios, conversions, volume measurement	reading chemical labels	measuring and pouring chemicals without splashing	- measure precisely - pour carefully, avoid splashing
g. fill sprayer with water	sprayer, water hose, gloves, aspirator	poisoning, skin or eye irritation			filling tank	- avoid splashing

(cont.)

Duty: D. Operating Equipment

Task: D49. Apply a Chemical with a Tractor Mounter Sprayer (cont.)

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
h. Mix solution	mixing tool or tank agitator	poisoning, skin or eye irritation			mixing without splashing	- mix thoroughly - avoid splashing
i. determine starting point and path of travel		poisoning, skin or eye irritation	tractor and sprayer operation			
j. put on appropriate safety gear (mask, goggles, etc.)	aspirator, rubber gloves, long sleeved shirt, goggles	poisoning, skin or eye irritation	chemistry	reading chemical labels	adjusting and wearing safety gear	- refer to chemical label for precautions
k. start movement of tractor and open nozzles	tractor mounted sprayer	poisoning, skin or eye irritation	tractor and sprayer operation		tractor driving, sprayer operation	- begin movement before starting spray - check operation of nozzles
l. operate at constant ground speed and pump pressure	tractor mounted sprayer	poisoning, skin or eye irritation	tractor and sprayer operation	reading speedometer and pressure gauge	tractor driving, sprayer operation	- check nozzles periodically - check for excessive drift

Duty: D. Operating Equipment

Task: D50. Edge a Sidewalk with a Power Edger

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Using a power edger, trim overlapping grass from the border of a concrete sidewalk						
a. set edger head in desired position	power edger, wrenches, operators manual	cuts, bruises	mechanics	read operators manual	use tools to make adjustments	- consult operators manual
b. perform machine maintenance as specified in manual	power edger, wrenches, screwdrivers, grease, oil, operators manual	cuts, bruises	mechanics	read operators manual	use tools to perform needed maintenance	- consult operators manual
c. start engine	power edger, safety glasses	cuts from moving blade			operate pull cord throttle	- wear safety glasses - stay clear of blade
d. select speed if applicable	power edger, safety glasses	cuts from moving blade			operate speed control	- wear safety glasses - stay clear of blade
e. determine starting point	power edger, safety glasses	cuts from moving blade				- wear safety glasses - stay clear of blade
f. lower blade to edge of sidewalk	safety glasses or goggles	cuts from moving blade, sidewalk chips			operate edger	- avoid blade contact with concrete
g. walk at a slow steady pace while trimming	safety glasses or goggles	cuts from moving blade, sidewalk chips			operate edger	- keep blade just off the edge of the concrete
h. clean off sidewalk when finished	shovel, broom				use shovel, broom	- remove all trimmings and sweep soil from sidewalk

Duty: D. Operating Equipment

Task: D50. Edge a Sidewalk with a Power Edger (cont.)

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
j. determine amount of chemical needed to spray one acre	calculator		ratios, conversions	reading chemical labels		- see chemical label or state recommendations
k. determine amount of material to be added to one tank of water	calculator		ratios, conversions, multiplication, division			- $\frac{\text{tank volume}}{\text{amount applied/acre}} \times \text{active amount to be applied/acre}$

Duty: D. Operating Equipment

Task: D 50. Rake Leaves With a Power Rake

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Rake the leaves in an area designated by the instructor, using a Power Rake.	Power Rake, operators manual, fuel, oil wrenches, eye protection	eye injuries from flying objects, foot or leg injuries from rake	maintenance skills	ability to read operators manual	use of common tools machine operation	1. Perform preliminary machine and engine maintenance as specified in operators manual. 2. Wear proper safety equipment 3. Start engine 4. Begin raking at outer edge of area 5. Rake in circular pattern, blowing leaves inward 6. Repeat until leaves are piled in center

Duty: D. Operating Equipment

Task: D 52. Remove Debris with a Vacuum Rake

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Remove all debris from a designated area using a power vacuum rake	Power Vacuum Rake, fuel, tractor, wrenches, eye protection, operators manual	injuries from flying debris, tractor accidents	maintenance skills	read operators manual	maintenance skills, use of common tools machine operation	1. Preliminary maintenance on tractor. 2. Preliminary maintenance on rake and auxiliary engine. 3. Adjust reel support arm if needed 4. Adjust rake depth 5. Place all controls in disengaged 6. Start engine 7. Engage controls 8. Maneuver equipment through area, removing debris 9. Observe safety precautions for machine operation

Duty: D. Operating Equipment

Task: D 53. Mow Grass with a Reel-Type Mower

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Mow and area of grass using a self-propelled reel-type mower	reel-type mower, fuel, operator's manual, wrenches, eye protection, hard shoes or boots	cuts from mower blades injuries from flying debris, cuts from mower blades	maintenance skills	reading operator's manual	use of common tools	1. Set cutting height of mower 2. Preliminary maintenance of mower as specified in operator's manual 3. Disengage all controls 4. Start engine 5. Lower cutting unit(s) 6. Mow the grass in the area 7. Observe safety precautions

Duty: D. Operating Equipment

Task: D 54. Mow Grass with a Rotary Mower

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Mow a designated area of grass with a rotary mower	Rotary mower, fuel, oil, operators manual, wrenches, eye protection, hard shoes or boots	cuts from mower blades, eye injuries from flying debris	maintenance skills machine operation	read operators manual	use common tools machine operation	1. Set cutting height of mower 2. Preliminary maintenance on machine and engine as specified in the operators manual 3. Check area for debris 4. Set throttle control 5. Start engine 6. Mow grass in area 7. Observe safety precautions

Duty: D. Operating Equipment

Task: D 55. Cut Grass with a Power Scythe

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Cut the grass around the edge of a designated building using a power scythe	power scythe, fuel, oil, operators manual, eye protection, cutting line, wrenches	cuts from power scythe, eye injuries from flying debris	maintenance skills	read operators manual	use of common tools machine operation	1. Preliminary engine maintenance as specified in the operators manual 2. Set cutting angle if necessary 3. Place machine on ground for starting 4. Start engine 5. Adjust throttle 6. Attach shoulder strap if applicable 7. Cut grass to same height as adjacent areas

Duty: D. Operating Equipment

Task: D 56. Load Topsoil on Truck with Front-End Loader

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Load topsoil onto a truck using a front-end loader	Front-end loader, truck fuel, operators manual, soil, hard hat, eye protection	injuries from capsizing tractor, falling rocks or soil		reading operators manual	tractor driving, operating hydraulic controls	1. Review operators manual for operating instructions 2. Practice operation of front-end loader in open area 3. Move machine into work area 4. Load soil into truck 5. Observe safety precautions for operation of heavy machinery

Duty: D. Operating Equipment

Task: D 57. Dig a Ditch with a Backhoe

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Dig a drainage ditch using a backhoe	Backhoe, fuel operators manual, hard hat, eye protection, measuring tape, level	injuries from capsizing tractor, falling rocks or soil		reading operators manual	tractor driving operating hydraulic controls	1. Review operators manual for operating instructions 2. Practice operation of backhoe in open area 3. Mark the line to be dug 4. Move backhoe into position to dig ditch 5. Begin removing soil along the drainage line 6. Reposition the backhoe as needed 7. Dig ditch with a grade of $\frac{1}{2}$ inch per foot of travel 8. Check grade of ditch periodically 9. Remove additional soil as needed 10. Observe safety precautions for machine operation

Duty: E. Constructing and Maintaining Facilities

Task: E 58. Clean Rest Rooms

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Clean a restroom including fixtures, floors, and walls	Cleaning solutions, hot water, sponges, rags, mop, mop bucket, replacement tissues and hand towels, broom, rubber gloves	skin and eye irritations or burns from cleansers			use of mop, broom and other cleaning tools	1. Assemble tools and materials needed for cleaning 2. Dust horizontal surfaces and remove excess paper 3. Clean walls and partitions with a disinfectant solution 4. Clean bathroom fixtures with disinfectant solution 5. Fill all dispensers 6. Sweep out room 7. Clean floor with a wet mop 8. Empty trash containers 9. Wear rubber gloves and eye protection when using caustic cleaning solutions

Duty: E. Constructing and Maintaining Facilities

Task: E 59. Clean Grounds of Leaves and Litter

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Remove leaves and paper litter from a designated area.	leaf rake, leaf broom, bags or other containers	cuts, scrapes			use of rake or broom	1. Assemble tools needed for cleaning the area 2. Gather and dispose of any paper or synthetic debris 3. Sweep or rake leaves and remaining litter into piles 4. Place leaves and litter in containers 5. Transport leaves and litter to appropriate disposal site

Duty: E. Constructing and Maintaining Facilities

Task: E 60. Construct a Plant Holding Arbor

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Construct an arbor for a climbing plant	wooden fence posts, post hole digger, nails, wood for arbor frame, woven wire	cuts, scrapes	linear measurements		use of common tools - post hole digger, hammer	1. Determine and prepare site for arbor 2. Install two posts (app 9 FT) about 4 feet apart on each side of the walkway 3. Install braces between side posts 4. Construct top arbor frame over walkway and attach to post tops 5. Install woven wire or other appropriate material on side and top of arbor frame 6. Check construction for weak points, sharp edges, etc.

Duty: E. Constructing and Maintaining Facilities

Task: E 61. Dispose of Pesticide Containers

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Safely dispose of pesticide containers in accordance with label instructions	pesticide containers, pesticide labels, eye protection respirator	burns, skin irritations or poisoning from toxic chemicals	understanding of basic chemistry, toxicology	ability to read and interpret pesticide label		1. Read label carefully for disposal instructions 2. Review local laws regarding disposal 3. Neutralize or dispose of remaining chemical according to label 4. Puncture or crush container to render it useless (except aerosol) 5. Bury or burn container, or carry to proper disposal site, according to label 6. Observe all safety precautions for working with toxic chemicals

Duty: E. Constructing and Maintaining Facilities

Task: E 62. Dispose of Prunings

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Use a power chipper to dispose of a stack of prunings	power chipper, fuel, operators manual, wrenches, safety glasses, work gloves	cuts or mutilation from chipper blades eye injuries from flying debris		ability to read operators manual	use of common tools machine operation	1. Pile prunings next to chipper 2. Perform preliminary maintenance on chipper according to operators manual 3. Wear gloves, eye protection 4. Feed prunings into chipper carefully. Be sure to release pruning before it is taken up by chipper's feeding mechanism 5. Stop power unit and remove chip container 6. Dispose of chips by mulching shrub or garden area 7. Observe safety precautions for operation of chipper

Duty: E. Constructing and Maintaining Facilities

Task: E. 63 Construct Fences

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Construct a wire fence on a designated site	fencing wire, fence posts, post hole diggers, fencing staples, nails, string, tape measure, come-along work gloves	foot or hand injuries from post hole digger cuts or scrapes from wire	linear measurement, addition, subtraction, multiplication, division		use of post hole digger use of hammer use of come-along	- Determine location - Lay out fence with string - Position and dig postholes (at least 3'6" deep and app. 10' apart) - Construct corner and brace assembly - Set posts and braces - Tamp posts, or pour concrete in holes - Position wire - Attach wire to corner post - Stretch wire to desired tightness. Free of crimps - Attach wire to posts

Duty: E. Constructing and Maintaining Facilities

Task: E 64 Revitalize Sod

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Revitalize sod in an area that has been compacted	material for barriers, rake, shovel, hoe, power tiller, fuel, operators manual, fertilizer, grass seed, hose, sprinkler, hard shoes or boots, work gloves	foot or hand injuries from tiller or hand tools	Fertilization horticulture, multiplication, and division for calibration of seed, fertilizer spreader	ability to read and interpret operators manual, seed & fertilizer labels	use of rake operation of power tiller, use of shovel, hoe, operation of fertilizer seed spreader	1. Construct barriers to prevent traffic and activity in area 2. Remove dead grass and debris 3. Loosen compacted soil using power tiller or hand tools 4. Fertilize soil 5. Smooth and grade seed-bed 6. Reseed area 7. Water area regularly until grass is well established 8. Observe safety considerations for use of tiller or hand tools

Duty: D. Constructing and Maintaining Facilities

Task: D 65 Sweep streets or Parking Lots

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Use an industrial sweeping machine to sweep a parking lot	industrial sweeper, fuel, water, operators manual, eye protection	eye injuries from flying debris		ability to read and interpret operators manual	use of common tools machine operation	1. Review manual for operating instruction 2. Adjust brooms according to specifications 3. Start brooms in motion 4. Use mirrors and guide side broom for sweeping along curb 5. Use water sprayer to control dust 6. Sweep lot; observe recommended speeds 7. Lift brooms from pavement when machine is stopped

Duty: E. Constructing and Maintaining Facilities

Task: E 66. Repair Streets

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Repair a pothole in a damaged street	Shovel, clay mixture, tamp, concrete mix, mixing bowl, asphalt mix	Foot injuries from tamp Skin irritation from concrete mix Burns from hot asphalt	Measurements Ratios for mixing compounds	Ability to read directions on concrete, asphalt mix labels	Use of shovel Use of tamp Mixing concrete, pouring concrete Pouring asphalt	1. Locate potholes to be repaired 2. Remove broken asphalt, loose materials from hole 3. Place new soil (clay mixture) in pothole 4. Compact soil in 6" layers to within 8" of surface 5. Mix and pour concrete into hole, to within 2" of the surface 6. Allow concrete to set for three days 7. Pour asphalt over concrete 8. Compact and smooth asphalt to a contour slightly above level of roadway

Duty: E. Constructing and Maintaining Facilities

Task: E 67. Repair Driveways

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Repair a concrete driveway at the street entrance	Ready-mix concrete, sand, water source, wood for forms (2x4's), hammer nails, screed heavy bristle broom	Skin and eye irritations from concrete mix	Linear measurements, ratios, volume calculations	Ability to read concrete mix instructions	Carpentry skills Mixing and pouring concrete leveling concrete	1. Break up and remove old concrete 2. Remove loose soil 3. Construct forms such that new section will blend with street, curb and old driveway 4. Mix and pour concrete 5. Screed and level concrete. Leave slope for entrance 6. Rough finish concrete 7. Allow concrete to set (3 to 4 days)

Duty: E. Construct and Maintain Facilities

Task: E 68. Apply Salt to Icy Sidewalks or Streets

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Remove ice, snow or slush from sidewalks using salt	Salt, bucket or spreader, broom	Skin or eye irritation from salt Falls from slick surface			Spreading salt evenly Use of broom	1. Load salt in bucket or mechanical spreader 2. Spread salt evenly over area 3. Wash spreader or bucket after use 4. Sweep water, slush or ice off of sidewalk as ice melts

Duty: E. Constructing and Maintaining Facilities

Task: E 69. Repair a Masonry Retainer Wall

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Repair a masonry retainer wall	Bricks, mortar mix, masonry tools, water source	Injuries from falling bricks	Linear measurements Ratios		Mixing mortar Masonry skills, use of masonry tools	1. Assemble masonry tools and materials 2. Locate loose bricks, cracks and empty spaces 3. Mix mortar according to instructions 4. Remortar loose joints 5. Replace missing bricks 6. Mortar cracks in wall 7. Smooth mortar joints 8. Clean up area

Duty: E. Constructing and Maintaining Facilities

Task: E 70. Set stones

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Construct an ornamental stone wall	mortar mix, stones, batter boards, string, shovel, tape measure, concrete mix, trowel, mortar joint tool, muriatic acid	skin, eye irritation from concrete mix skin, eye irritation from mortar mix injury from dropped stones skin, eye irritation from muriatic acid	linear measurements ratios, calculated volume ratios	read cement and mortar mix directions	use of batter board, string guides trench digging measuring and mixing concrete pouring concrete measuring and mixing mortar masonry skills, use of trowel masonry skills, use of batter board use of mortar joint tool	1. Lay out footing using batter boards and string 2. Dig trench for footing 3. Set stakes to mark footing level 4. Mix concrete 5. Pour concrete in trench to desired footing level 6. Assemble masonry materials 7. Mix mortar 8. Apply mortar to stones and joints with trowel 9. Set stones in place using batter 10. Smooth mortar joints with joint tool 11. Clean stones with muriatic acid

Duty: E. Constructing and Maintaining Facilities

Task: E 71. Paint Lawn Furniture

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Paint a metal lawn chair	Paint, metal lawn chair, paint brushes, paint thinner, wire brush, tarp, turpentine, respirator	toxicity of paint particles toxicity of paint and paint thinner			use of wire brush mixing paint painting	1. Use wire brush to remove rust and dirt from metal surface 2. Mix, paint (use rust inhibiting paint) 3. Place chair on tarp 4. Apply first coat 5. Allow paint to dry 6. Apply second coat of paint 7. Clean brush between coats

Duty: E. Constructing and Maintaining Facilities

Task: E 72. Dig Drainage Ditches

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Reconstruct a drainage ditch that has been filled due to erosion			knowledge of erosion and causes			
a. remove debris from ditch	work gloves	cuts, scrapes				1. tree branches, garbage etc.
b. level ditch bottom	shovels or ditching machine	cuts, scrapes		read machine manual	use of shovel, ditching machine	2. dig out high points, use fill dirt to fill low points
c. slope ditch banks	shovels or ditching machine	"		"	"	3. use shovel or ditching machine
d. tamp base of ditch	hand tamp or packing machine	"		"	use of tamp or packing machine	4. use hand tamp or rubber tired packing machine
e. place broken concrete (rip-rap) at base of ditch	concrete	injuries from dropped concrete pieces				
f. pour concrete over rip-rap	concrete mix	skin, eye irritation			mixing and pouring concrete	5. fill in all cracks
g. smooth concrete	board				smoothing concrete	
h. plant ditch banks	grass or legume seed		horticulture	reading seed label	spreading seed	6. plant fast growing grass or legumes

Duty: E. Constructing and Maintaining Facilities

Task: E 73 Clean Drainage Ditches

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Clean out a drainage ditch clogged with debris			knowledge of erosion, drainage			
a. determine causes of poor drainage						1. Branches, weeds, eroded soil, garbage etc.
b. remove obstructions from ditch	shovels, rakes rope, wheelbarrow, work gloves	cuts, scrapes			use of shovel, rake	2. Clear weeds, lift out debris
c. grade ditch if needed	shovels or backhoe				use of shovel or backhoe operation	3. Shovels or backhoe
d. dispose of debris	pickup truck or trailer	vehicle accidents, burns			vehicle operation or building trash fire	4. Burn or carry to appropriate disposal site

Duty: E. Constructing and Maintaining Facilities

Task: E 74. Clean Ornamental Pools

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Clean a gravel bottom ornamental pool						
a. drain water from pool						
b. remove gravel from pool bottom	shovel, wire screen in frame				use of shovel	1. Place gravel on wire screen for cleaning
c. clean gravel	hydrochloric acid, hose, hose proportioner	burns from acid	knowledge of acid reactions		use of hose proportioner	2. Flush gravel with hydrochloric acid and water solution
d. clean pool superstructure, drains etc.	scrub brush, detergent, hose				use of scrub brush	3. Scrub with detergent and water
e. return gravel to pool	shovel, rake					4. Rinse pool and gravel with clean water before refilling
f. refill pool	water hose					5. Distribute gravel evenly

Duty: E Constructing and Maintaining Facilities

Task: E 75 b. Repair Irrigation Lines and Spray Components

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Remove obstructions from irrigation lines and spray components						
a. check and clear pop-up heads	wrenches, high pressure water hose, replacement valves		mechanical skills		use of wrenches	1. Disassemble and clean heads with water sprat 2. Replace reset valves if necessary
b. remove obstructions from supply lines	wrenches, high pressure water hose		"		use of wrenches, high pressure spray	3. Use high pressure directed water spray or hand a auger
c. replace damaged supply lines	replacement pipes and joints, pipe wrench		"		"	4. Check for cracks, leaking joints
d. repair or replace leaky valves	replacement valves, gaskets wrenches		"		use of wrenches	5. Replace gaskets or entire valves

Duty: E. Constructing and Maintaining Facilities

Task: E 75. Clean and Refill Pools

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Clean and refill a swimming pool						
a. drain pool						
b. remove debris from pool	broom, shovel	falls from slippery pool bottom			sweeping	1. Open valve, keep trap free of debris 2. Leaves, loose dirt, twigs, etc.
c. clean pool surfaces	hose, hose proportioner, hydrochloric acid, work gloves, goggles	" burns from acid	chemistry, measurement		use of hose proportioner	3. Hydrochloric acid and water solution
d. make needed repairs	sealant and dispenser, tiles				use of sealant dispenser	4. Fill cracks, replace loose tiles
e. paint as needed	pool paint, brush	toxicity of paint		read paint label	painting	5. Allow paint to dry . .
f. clean drains	scrub brush, detergent				use of scrub brush	6. Remove debris, scrub with detergent
g. rinse surfaces	water hose					
h. refill pool	drain plug, water hose					7. Replace plug
i. add pool chemicals	pool chemicals, measuring device		measurement ratios		mixing, measuring chemicals	8. Follow recommended proportions

Duty: F. Maintaining Plants

Task: F 76. Remove Grass from Flower Bed Edges

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Remove grass from the edge of a flower bed						
a. stretch a string along the edge of the flower bed	string, wooden stakes				placing stakes, tying string	1. Stretch string about 1" from surface
b. make a vertical cut along the edge	power or hand edger, hard shoes or boots	cuts from edger			operation of edger	2. Use a hand or power edger 3. Follow line of string
c. dispose of clippings	pail or wheel barrow					4. Shake soil from roots
d. remove string						

Duty: F. Maintaining Plants

Task: F 77. Remove Weeds and Grass from Flower Beds.

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Remove weeds and grass from a flower bed.						
a. dampen soil if necessary	water hose				watering	1. Determine if soil is too hard for weeding 2. Use small amount of water
b. uproot weeds with hoe	hoe, work gloves, shoes or boots	blisters, foot injuries	plant identification			3. short, shallow strokes to avoid damaging plant roots
c. pull weeds by hand					pulling weeds	4. Pull weeds gently to avoid breaking roots 5. Shake soil from roots
d. move weeds to edge of flower bed						6. Pile weeds together 7. Dispose of weeds away from garden area
e. level soil surface	hoe or rake				using hoe or rake	8. Use hoe or rake
f. water flower bed	sprinkler, water hose,				watering	9. Wet soil thoroughly

Duty: F. Maintaining Plants

Task: F 78. Plant Annual Flowers

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Plant annual flowers from containers to a prepared seedbed						
a. check soil moisture of seedbed	water hose		horticulture			1. Soil should be moist but not wet and loose for planting
b. dig hole for planting	shovel or hand digger		"		digging	2. Twice the width of root ball and slightly deeper than root ball
c. cut both sides of container to remove plant	scissors		"		use of scissors	3. Cut containers and remove plant just prior to planting
d. set plant in hole			"		planting	4. Fill in with soil below and around rootball. Base of plant should be at seedbed surface
e. water each hole	water hose or sprinkling can		"		watering	5. Soak hole thoroughly
f. construct shading device	screening, wood, nails, hammer		"		carpentry	6. Temporary, protect plant while new roots are established

Duty: F. Maintaining Plants

Task: F 79. Transplant Bulbs

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1 Transplant bulbs to a prepared seedbed						
a. remove bulbs from package or bed	bulbs		horticulture			1. Include some surrounding soil with bulbs removed from bed
b. dig hole for bulb	shovel, hand digger		"		digging	2. 6 to 8 inches deep or as recommended on package
c. place bulb in hole	bulbs		"		planting	3. Pointed end upward
d. fill hole with soil	shovel, hand digger		"		digging	4. Do not pack excessively
e. water each hole thoroughly	waterhose or sprinkling can		"		watering	5. Soak hole thoroughly.

Duty: F. Maintaining Plants

Task: F 80. Add Mulch to Plants

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Add mulch to a bed of newly planted seedlings						
a. prepare seed-bed for mulch	hoe, rake	cuts, scrapes	horticulture		use of hoe and rake	1. Pull weeds 2. Clean soil surface
b. spread mulch	pitchfork, rake mulch material	"	"		"	3. Two to three inches deep 4. Leave area size of plants diameter uncovered
c. smooth surface of mulch	rake	"	"		"	
d. water	water hose, sprinkler		"		watering	5. Moisten mulch to hold place

Duty: F. Maintaining Plants

Task: F 81. Water Plants

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Water a group of plants for one month						
a. determine amount of water needed by each plant	plants, reference material		horticulture			1. Soil type, degree of slope, size of container, type of plant, location of plant
b. check equipment	wrenches, irrigation system		mechanics		mechanical skills	2. Check for obstructions, leaks
c. set up sprinklers	sprinklers		"		"	3. Set appropriate coverage
d. turn on water	"		"		"	
e. regulate water flow	"					5. Check coverage and runoff
f. check area frequently	"					6. Adjust accordingly

Duty: F. Maintain Plants

Task: F 82. Prune Shrubs

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Prune a shrub for the purpose of shaping						
a. determine the desired shape of the shrub	shrubs, drawing materials		horticulture			1. Plan for future growth of shrub
b. select appropriate pruning tools	pruning tools, file or grinder	cuts, scrapes	"		sharpening tools	2. Check for cleanliness and sharpness
c. remove growth that extends past desired shape	"	"	"		using pruning tools	3. Remove clusters and single shoots 4. Make cuts 1/4 inch above bud or side branch
d. clean up clippings	wheel barrow, garbage bags	"	"		"	5. Dispose of properly

Duty: F. Maintain Plants

Task: F 83. Prune Shrubs

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Prune an ornamental shrub with branches three-fourth in diameter or less, for the purpose of stimulation and rejuvenation						
a. inspect tools	pruning tools, file or grinder	cuts, abrasions			use of file or grinder	1. Clean and sharpen pruning tools if needed.
b. remove insect and disease infested branches	pruning tools	"	insect and disease identification		use of pruning tools	2. Inspect closely for symptoms of diseases or insects 3. Make cuts $\frac{1}{4}$ inch above a bud or side branch
c. remove suckers	"	"	horticulture		"	4. Cut off at ground level
d. remove broken or dead branches	"	"	"		"	5. Cut off just below break or dead portion
e. remove duplicate branches and asymmetrical growths	"	"	"		"	6. Plan desired shape before pruning
f. clean up clippings	wheel barrow, garbage bags	"	"			7. Destroy disease or insect infested prunings

Duty: F. Maintaining Plants

Task: F 84. Prune and Trim Shrubs

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Prune and trim ornamental shrub with branches three-fourth to one and one-half inches in diameter for the purpose of stimulation and rejuvenation	pruning saw, lopping shears, heavy primary knife, file or grinder	cuts abrasions			cleaning and sharpening tools	1. Clean and sharpen if necessary
a. inspect tools						
b. remove diseased or insect infested growth	"	"	horticulture		using pruning tools	2. Make cuts $\frac{1}{2}$ inch above bud or small side branch 3. Remove all of inspected area
c. remove suckers	"	"	"		"	4. Cut off at ground level
d. remove broken or dead branches	"	"	"		"	5. $\frac{1}{2}$ inch above bud or side branch
e. remove duplicate branches and asymmetrical growth	"	"	"		"	6. Plan ahead for desired shape
f. clean up clippings	wheel barrow, garbage bags	"	"			7. Burn diseased or insect infested clippings

Duty: F. Maintaining Plants

Task: F 85 Prune and Trim Trees

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Prune a tree with branches greater than 1½ inches in diameter						
a. inspect tools and equipment	pruning tools, climbing equipment	cuts, abrasions	mechanics		cleaning and sharpening tools	1. Operating condition, sharpness
b. select appropriate tool for diseased or injured wood	pruning saw, power saw, pole saw, pruning knife	"	horticulture		use of pruning equipment	2. Pruning saw, power saw, pole saw, pruning knife
c. remove dead, diseased or injured wood	pruning tools, climbing equipment, ropes, safety gear	cuts, abrasions, falls	"		tree climbing, use of pruning equipment	3. Cut below injury or dead wood, slightly above side branch
d. remove wayward branches	"	"	"		"	4. Cut just above side branch or flush with leader
e. lower or raise crown of tree	"	"	"		"	5. Use pruning techniques to achieve desired shape
f. thin the crown of tree	"	"	"		"	6. Use ropes to lower cut branches
g. clean up trimmings	rake, wheelbarrow					7. Burn any diseased or insect infested branches

Duty: F. Maintaining Plants

Task: F 86 Prune Hedges

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Prune a hedge to a predetermined shape						
a. inspect tools and equipment	electric or manual hedge shears	cuts, abrasions	mechanics		cleaning and sharpening tools	1. Sharpen and clean tools as needed
b. determine size and shape desired	"	"	horticulture			2. Plan shape that will allow light to reach all areas of hedge
c. remove necessary growth to achieve shape	"	"	"		using pruning tools	3. Cut slightly under-size
d. clean up clippings	rake, wheel barrow or garbage bags	"	"		raking	4. Rake and dispose of clippings

Duty: F. Maintaining Plants

Task: F 87. Identify Flammable Chemicals

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. From an assortment of chemicals, identify those that are flammable	labeled containers of chemicals	toxicity and flammability of chemicals	knowledge of chemistry	ability to read chemical labels		1. Read container or label after used to indicate flammability 2. Read label carefully looking for key word "FLAMMABLE"

Duty: F. Maintaining Plants

Task: F 88. Store Agricultural Chemicals

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. List recommendations for safe storage of an assortment of agricultural chemicals	labeled containers of agricultural chemicals	toxicity and flammability of chemicals	knowledge of chemistry	ability to read chemical labels		1. Pesticides must be stored in a locked ventilated room 2. Toxic chemicals must be stored away from feed 3. Check label for temperature requirement or special precautions 4. Always store chemicals in original, labeled container

Duty: F. Maintaining Plants

Task: F 89. Check Plants for Insects

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Determine if plants in a flower or shrubbed are infested with insects						
a. check overall appearance of plants	flower or shrub bed		horticulture, entomology, insect I.D.,			1. Wilting 2. Discoloring of leave or stem
b. examine individual plants	"		"		examination of plant	3. Upper and lower surfaces of leaves 4. Stems 5. Individual branches
c. check soil around and beneath plants	shovel or trowel	insect bites	"		digging soil sample	6. Look for caterpillar and other soil insects
d. remove samples for further examination if necessary	knife or scissors	"	"		cutting plant sample	7. Symptoms of damage, from microscopic insects 8. Insects may need further identification for control measures

Duty: F. Maintaining Plants

Task: F 90. Apply Chemical Treatments to Diseased Plants

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Apply a chemical to eliminate a disease that has been identified on plants						
a. determine appropriate chemical	disease control guides, manufacturers literature		horticulture, chemistry, plant pathology	read and interpret disease control recommendations		1. Review state disease control recommendations
b. read label	chemical labels		"	read and interpret chemical labels		2. Review manufacturers recommendations
c. check weather conditions	current weather data		meteorology	read and interpret weather data		3. Chemical must be approved for plant and disease in question
d. prepare chemical for use	chemical labels, water, measuring device,	toxicity of chemicals	multiplication, division, ratios, measurement	read and interpret chemical labels		4. Wind direction and velocity, precipitation
e. prepare sprayer or spreader	sprayer, spreader, calculator	"	"	"		5. Follow label recommendations precisely ..
f. spray affected area	chemical, sprayer or spreader	"		"		6. Check for proper operation
g. dispose of container if empty	empty container	"	chemistry	"		7. Calibrate
h. dispose of excess material	chemical label, excess chemical	"	"	"		8. Cover upper and lower leaf surfaces
i. store chemical	chemical containers, storage area	"	"	"		9. Follow recommendation
j. clean spray equipment	detergent, water	"	"	"		10. Follow state regulations
k. clean exposed skin	detergent, water	"	"	"		11. Follow state recommendations
						12. Store in locked ventilated area
						13. Use soap and water
						14. Use soap and water

Duty: F. Maintaining Plants

Task: F 91. Apply Chemical Treatment to Plants Infested with Insects

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Apply a chemical that will kill insects infesting plants						
a. determine appropriate chemical	state pesticide use manuals, manufacturers literature		Entomology, insect identification	ability to read and interpret pesticide manuals		1. Identify insect carefully
b. read label	pesticide labels		chemistry	ability to read and interpret pesticide labels		2. Chemical must be one recommended for specific plant and insect
c. mix chemical	chemical, water source, spray tank, respirator, rubber gloves	toxicity of chemicals	chemistry, measurements, ratios	"	measuring, mixing	3. Verify that chemical is approved for situation
d. prepare sprayer	pesticide sprayer	"	"	"	operating sprayer	4. Determine proper rate
e. spray plants	pesticide sprayer, pesticide respirator, goggles, rubber gloves	"	entomology	"	"	5. Measure and mix carefully according to instructions
f. dispose of empty containers	empty chemical container, labels	"	chemistry	"		6. Calibrate sprayer
g. dispose of excess chemicals	excess pesticide, pesticide label	"	"	"		7. Check nozzles
h. store chemicals	storage area, pesticide containers	"	"	"		8. Check for complete coverage
i. clean up	water, detergent	"	"	"		9. Follow label instructions and state regulations
						10. Follow label instructions and state recommendations
						11. Store in a ventilated area
						12. Clean spray equipment with detergent and water
						13. Wash exposed skin thoroughly

Duty: F. Maintaining Plants

Task: F 92. Apply weed killing compounds to lawns with a Compressed Air Sprayer

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Apply herbicide to a lawn using a portable, compressed air sprayer						
a. determine appropriate chemical	weed control manuals, manufacturers literature		horticulture, weed identification	ability to read and interpret pesticide labels		1. Identify weeds
b. read label	herbicide label		chemistry	ability to read and interpret pesticide label		2. Select specific chemical to kill weeds but not harm turf
c. mix chemical	herbicide label, spray tank, safety equipment	Toxicity of Chemicals	chemistry, measurements, ratios	"	measuring, mixing	3. Verify that chemical is approved for situations
d. prepare sprayer	sprayer, herbicide, water	"	"	"	operating sprayer	5. Measure carefully
e. spray weeds	sprayer, safety equipment	"		"	"	6. Use safety equipment gloves, goggles, respiration
f. dispose of excess chemicals	herbicide label	"	chemistry	"		7. Remove pump, fill tank
g. dispose of container	"	"	"	"		8. Replace pump, pressurize
h. clean up	"	"	"	"		9. Adjust nozzle
						10. Wet weeds thoroughly
						11. Follow recommended rates
						12. Follow state regulations and label directions
						13. Follow state regulations and label directions
						14. Wash sprayer with detergent and water
						15. Wash exposed skin thoroughly

Duty: F. Maintaining Plants

Task: F 93. Apply Weed Killing Compound to Lawns

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Apply herbicide to a lawn using a tractor mounted sprayer						
a. determine appropriate chemical	weed control manuals, manufacturers literature		horticulture, weed I.D.	ability to read and interpret pesticide manuals		1. Identify weeds
b. read chemical label	herbicide label		chemistry	ability to read and interpret pesticide labels		2. Select specific chemical to kill weeds but not harm turf.
c. calibrate sprayer	spray rig, water, measuring tape, bucket, watch		multiplication division, ratios, conversions, measurements		tractor and sprayer operation	3. Verify that chemical is approved for situation
d. mix chemicals	herbicide, spray tank, surfactant, rubber gloves, goggles, respirator	toxicity of chemicals	chemistry, ratios		measuring, mixing	4. Determine proper rate of application
e. fill spray tank	"	"	"			5. Determine proper speed, tank pressure and nozzle settings
f. spray lawn	tractor, spray rig, safety equipment	toxicity of chemicals, tractor accidents	"		tractor and sprayer operation	6. Measure carefully
g. dispose of excess chemicals and containers	chemical label	toxicity of chemicals	"			7. Use safety gear
						8. Add chemical and additives (surfactant, etc.)
						9. Fill to top with water
						10. Maintain steady speed and RPM
						11. Observe safety precautions for spraying and tractor driving
						12. Follow state regulations and label directions

Duty: F. Maintaining Plants

Task: F 93 (con't). Apply Weed Killing Compound to Lawns

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
h. store chemicals	chemical label	toxicity of chemicals	chemistry, ratios			13. Store in a locked, ventilated area
i. clean up	"	"	"			14. Wash spray equipment and skin with soap and water

Duty: F. Maintaining Plants

Task: F94. Transplant Trees

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Move small tree to a specified location						
a. Wet soil if necessary	Water hose		Horticulture		Watering	1. Soil must hold together in root ball
b. Determine size of root ball	Measuring tape, shovel		Linear measurements			2. Do not sever any large roots
c. Cut trench around tree	Shovels	Abrasions, cuts	Linear measurements		Digging	3. Deep enough to undercut the main taproot
d. Undercut root ball	Shovels	Abrasions, cuts			Digging	4. Do not sever any large roots
e. Remove tree from hole	Hydraulic lift or ropes	Abrasions, cuts				5. Keep soil in place with root ball
f. Wrap root ball	Burlap, pins	Abrasions, cuts			Wrapping and pinning burlap	6. Place on spread out burlap 7. Pin burlap around base of tree
g. Prepare new site	Shovel, mulch, fertilizer, lime	Abrasions, cuts	Horticulture, Linear measurements		Digging and measuring	8. Dig hole, fertilize, add organic matter, etc
h. Transplant tree	Shovel, mulch, water hose	Abrasions, cuts	Horticulture		Digging	9. Bury to original base of tree 10. Allow for settling 11. Mulch around tree 12. Water thoroughly

Duty: F. Maintaining Plants

Task: F95. Transplant Trees

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Transplant a bareroot tree to a specified location						
a. Remove plant from container	Bareroot tree in container		Horticulture			1. Check for damaged roots 2. Remove any broken roots
b. Dig hole	Shovel	Abrasions, cuts	Horticulture		Digging	3. Six inches deeper and 6 inches wider than root system
c. Place plant in hole	Bareroot tree	Abrasions, cuts	Horticulture		Digging	4. Plant same depth as previously growing 5. Spread roots to natural growing position
d. Fill hole	Shovel	Abrasions, cuts	Horticulture		Digging	6. Tamp soil til firm 7. Water plant, add soil after settling
e. Wrap & stake tree if needed	Burlap, stakes, twine	Abrasions, cuts	Horticulture		Wrapping and staking tree	8. Protect from wind or cold damage
f. Prune tree if necessary	Pruning shears	Abrasions,	Horticulture		Pruning	9. Remove dead wood
g. Water thoroughly	Water hose		Horticulture			10. Water regularly until roots are established

Duty: F. Maintaining Plants

Task: F96. Brace Newly Planted Trees

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Brace a newly planted tree with a trunk diameter of 2 inches or less						
a. Determine the length of the stake	Measuring tape		Linear measurements, addition, multiplication, division			1. Stake should reach midpoint of tree when driven 2 feet into the ground
b. Cut stake	Wooden stake, saw				Use of saw	2. Cut to the length determined in "a"
c. Drive stake	Hammer, wooden stake, step ladder	Injuries from hammer			Use of hammer, step ladder	3. Drive stake 2 feet into ground, six inches from trunk on windward side
d. Tie stake to tree	Rope or leather strips				Tying knots	4. Tie in at least 3 places 5. Use leather strips, rope, or other material which will NOT cut into tree

Duty: F. Maintaing Plants

Task: F97. Brace Newly Planted Trees

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Brace a newly planted tree with a trunk diameter greater than two inches						
a. Tie three guy wires to tree	Wires, wire cutters, hose, knife	Abrasions, cuts	Horticulture		Cutting and tying wire	1. Tie at point where branches begin 2. Insert wire through sections of hose where in contact with tree
b. Cut stakes to correct length	Wooden stakes, saw	Abrasions, cuts	Linear measurements		Sawing wood	3. Stakes must be long enough to anchor securely in ground, leaving enough above ground for tying guy wires
c. Drive stakes	Wooden stakes, hammer	Abrasions, cuts	Linear measurements, angles		Driving stakes	4. Drive stakes at distance forming an equilateral triangle
d. Attach wires to stakes	Wire cutters, pliers	Abrasions, cuts			Cutting and tying wire	5. Anchor guy wires such that tree stands upright
e. Mark wires for safety	Colored rags or ribbons	Abrasions, cuts			Tying cloth or ribbon	6. Tie white rags or colored ribbons along length of wires

Duty: F. Maintaining Plants

Task: F98. Train Plants And Shrubs (Espaliering)

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Train an espalier plant to a pre-determined shape						
a. Determine the ultimate size and shape of plant	Potted plant, chalk or pencil		Horticulture, knowledge of plant growth habits		Drawing skills	1. Draw design on paper or on back-ground
b. Construct a frame or lay-out design on background structure	Wood, hammer, nails	Abrasions, cuts	Horticulture		Construction skills	2. Wooden frame or nail and wire design on back-ground
c. Drive masonry nails along design if appropriate	Masonry nails, hammer	Abrasions, cuts	Horticulture		Construction skills	3. Use nails to outline design
d. Tightly string copper wire between nails	Copper wire, wire cutters	Abrasions, cuts	Horticulture		Construction skills	4. Wrap wire securely around nails
e. Place plant next to wall	Potted plant, pruning shears, shovel		Horticulture		Planting and pruning	5. Prune all growth from outside part of plant 6. Retain the side branches that can be bent to tie to the wire
f. Tie branches to wire	Twine		Horticulture		Tying knots	7. Continue to bend and tie branches, prune outside as plant grows

Duty: F Maintaining Plants

Task: F99. Train Plants And Shrubs (Pleaching)

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Prune and interweave plants on an arbor to accomplish pre-determined design or shape						
a. Determine the ultimate shape or design	Pencil, paper, plants		Horticulture, knowledge of, plant growth habits		Drawing skills	1. Draw design on paper 2. Consider natural growth habits of plant
b. Prune trunks of plants	Pruning saw	Abrasions, cuts	Horticulture		Use of saw	3. Trunks should be straight and equal distance apart
c. Prune front and back branches	Pruning shears	Abrasions, cuts	Horticulture		Use of pruning shears	4. Leave branches that can be bent to the sides
d. Prune top and lower branches	Pruning shears	Abrasions, cuts	Horticulture		Use of pruning shears	5. Form level planes
e. Interweave the side branches with adjacent branches	String	Abrasions, cuts	Horticulture		Weaving branches	6. Repeat as growth continues

Duty: F. Maintaining Plants

Task: F100. Build Supporting Structure For Training Vines

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Build supporting structure for training fruit vine						
a. Determine designed spread of the vine			Horticulture, knowledge of plant growth habits, linear measurements			1. Length of structure and height of desired growth
b. Dig postholes	Posthole digger and posts	Abrasions, cuts	Linear measurements		Use of posthole digger	2. Holes should be at least 3 feet deep and 8 feet apart
c. Set and brace	Tamping bar, brace posts, hammer, nails	Abrasions, cuts	Linear measurements		Construction skills, tamping	3. Fill holes and tamp firmly
d. Stretch wire on posts	Wire, fencing staples	Abrasions, cuts	Linear measurements		Stretching and stapling wire	4. Stretch wires six to twelve inches apart depending on plant 5. Staple wire to posts

Duty: F. Maintaining Plants

Task: F101. Treat Cavities In Trees

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Treat tree cavity						
a. Determine the extent of the cavity		Abrasions, cuts	Silviculture			1. Cavity may be larger inside than at the surface
b. Remove the diseased or damaged wood and bark	Hammer, chisel, knife	Abrasions, cuts	Silviculture		Use of hammer and chisel	2. Use a hammer and chisel 3. Remove all loose bark and rotten wood
c. Smooth area	Hammer, chisel, knife	Abrasions, cuts	Silviculture		Use of hammer and chisel	4. Use chisel or knife to create smooth surface on live wood
d. Apply wound dressing	Wound dressing, paint brush	Wound dressing may be toxic	Silviculture		Use of paint brush	5. Apply even coat using a paint brush

Duty: F. Maintaining Plants

Task: F102. Apply Tree Paint To Tree Wounds

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Apply a coat of antiseptic tree paint to areas exposed by pruning						
a. Clean and smooth cut area	Pruning knife, climbing equipment	Falls, cuts	Silviculture		Use of pruning knife	1. Use pruning knife
b. Apply tree paint	Tree paint, paint brush, climbing equipment	Falls, Tree paint may be toxic	Silviculture		Use of paint brush	2. Fill pores in wood 3. Cover all exposed areas

Duty: F. Maintaining Plants

Task: F103. Brace Overloaded Limbs Or Branches

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Brace the limbs of a tree that has a V-crotch at the first two limbs						
a. Determine the best location for brace	Measuring tape	Falls	Silviculture, Linear measurements		Measuring	1. Brace should be at least 4 feet above the crotch depending on the angle of limbs
b. Drill holes for eyebolts	Drill, drill bit	Falls, cuts, abrasions	Silviculture, Linear measurements		Operate drill	2. Holes should be parallel to the direction of the cable pull
c. Fasten eyebolt through each limb	Eyebolts, nuts, washers, pliers	Falls, cuts, abrasions	Silviculture, Linear measurements		Fastening the eyebolts	3. Fasten eyebolts securely 4. Eyebolts may be anchored on the other side of limb
d. Fasten steel cable to the eyebolts	Steel cable	Falls, cuts, abrasions	Silviculture, Linear measurements		Fastening cable	5. Tighten cable until snug

Duty: F. Maintaining Plants

Task: 1 F104. Remove Stumps With A Router

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Remove a stump using a stump router						
a. Perform any preliminary maintenance of auxiliary engines	Stump router, operator's manual, fuel, wrenches	Abrasions, cuts	Mechanics	Ability to read and interpret manual	Maintenance ability	1. Follow instructions in the operator's manual
b. Start router	Eye protection, stump router, operator's manual	Cuts, eye injuries from flying chips			Machine operation	2. Adjust for size of stump, etc
c. Place router over stump and begin operation	Eye protection, stump router, operator's manual	Cuts, eye injuries from flying chips			Machine operation	3. Follow operating instructions
d. Stop and remove the router	Eye protection, stump router operator's manual	Cuts, eye injuries from flying chips			Machine operation	4. Use all necessary safety precautions
e. Remove wood chips from area	Rake				Use of rake	5. Observe safety precautions
f. Fill hole	Shovel				Use of shovel	6. Clean up area thoroughly
						7. Fill and pack to same level as the surrounding area

Duty: F. Maintaining Plants

Task: F105. Remove Dead Or Unwanted Trees

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Remove small tree such that no portion of the trunk remains in ground						
a. Remove soil from around stump	Shovel	Abrasions, cuts	Silviculture		Digging	1. Use shovel to expose main roots
b. Cut roots	Shovel, ax, saws	Abrasions, cuts			Use of ax or saw	2. Use power saw, hand saw or ax depending on size of roots
c. Place chains around stump or base of tree	Chains	Abrasions, cuts			Wrapping and securing chains	3. Wrap the chains tightly
d. Place parallel timbers on either side of base	Heavy timbers	Abrasions, cuts				
e. Place third timber across one and two	Heavy timbers	Abrasions, cuts				4. Third timber should be as close to base as possible
f. Place jack on third timber	Jack	Abrasions, cuts				
g. Secure jack to chains	Jack	Abrasions, cuts			Securing chains	5. Secure chains tightly to jack
h. Jack up stump	Jack	Abrasions, cuts			Using jack	6. Cut additional roots as needed

Duty: F. Maintaining Plants

Task: F106. Gird Trees

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Use ax to gird a tree						
a. Use an ax to begin cutting a ring around the tree	Hand ax	Cuts, bruises from ax	Horticulture, silviculture		Using an ax	1. Two feet from ground level 2. Cut ring about 2 inches wide
b. Continue cutting until the tree is circled	Hand ax	Cuts, bruises from ax	Horticulture, silviculture		Using an ax	3. Remove all bark and the cambium layers

Duty: F. Maintaining Plants

Task: F107. Construct Covers To Protect Plants From The Weather

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Construct a portable shading device to protect new plants from direct sunlight						
a. Determine the needs of the plants to be shaded	Horticultural references		Horticulture			1. Height, species and age of plants
b. Take measurements	Measuring tape		Linear measurements		Measuring	2. Expected growth while shaded
c. Lay out and cut materials	Screening, saw, wooden stakes, measuring tape, scissors		Linear measurements		Use of scissors and saw	3. Length of the supporting stakes
d. Assemble the materials	Wooden stakes, nails, staples, hammer, screening material	Cuts, bruises			Construction skills	4. Overall size of the screen
e. Put device in position	Wooden stakes, nails, staples, hammer, screening material	Cuts, bruises			Construction skills	5. Avoid waste of materials
f. Store for later use	Portable shading device, storage area					6. Nail or staple screening to the stakes and cross beams
						7. Roll up screen and stakes

Duty: F. Maintaining Plants

Task: F108. Wrap Trees To Protect From The Weather

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Wrap thin barked tree to protect it from the cold weather						
a. Cut wrapping material	Wrapping material, scissors	Cuts	Horticulture		Use of scissors	1. Burlap or other cloth may be used 2. Cut in long strips 6 to 8 inches wide
b. Wrap the tree trunk	Wrapping material				Wrapping cloth	3. Begin at the top; about 5 feet up or where the branches begin 4. Wrap in a spiral, overlapping fashion 5. Fold edges under if burlap is used
c. Wrap string to hold the	String or twine				Wrapping and tying string	6. Wrap string in opposite direction (from bottom) and tie tightly

Duty: F. Maintaining Plants

Task: F109. Construct Covers To Protect Plants From The Weather

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Construct portable caps for protecting the plants from frost						
a. Determine the needs of the plants	Horticultural references		Horticulture			1. Age, size, species and cold tolerance of plant
b. Take measurements for each cap	Tape measure		Horticulture		Linear measurements	2. Should NOT be in contact with plant when in place
c. Lay out and cut material	Scissors, knife, burlap or other insulating material		Horticulture		Linear measurements, Use of scissors, knife	3. Cut to predetermined size
d. Make necessary folds in the material	Scissors, knife, burlap or other insulating material		Horticulture		Folding and forming material	4. Fold to make cap shape
e. Form folds into caps	Insulating materials, wire		Horticulture		Folding and forming material	5. Use wire for support if needed
f. Store caps for later use						

Duty: F. Maintaining Plants

Task: F110. Fill In Holes Or Depressions In Lawn

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Fill all holes and depressions in a lawn with topsoil						
a. Load a wheelbarrow with	Wheelbarrow, topsoil, shovel	Muscle strain	Horticulture		Use of shovel, wheelbarrow	1. Do NOT overload
b. Locate holes or depressions						
c. Mark locations	Stakes, flag markers				Driving stakes, attaching flags	2. Use stake or flags to mark the holes
d. Fill each hole	Wheelbarrow, topsoil, shovel				Use of shovel, wheelbarrow	3. Fill to surface and pack to prevent runoff
e. Rake topsoil to contour	Rake				Use of rake	4. Create smooth, uniform surface for planting

Duty: F. Maintaining Plants

Task: F111. Sod Worn Spots In Lawn

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Sod worn or bare spots on an established lawn						
a. Till and smooth soil on worn spots	Tiller or hoe, shovel, rake	Abrasions, cuts	Horticulture		Operate tiller, use shovel, hoe and rake	1. Till to shallow depth 2. Rake for smooth, loose seedbed
b. Lay sod	Sod rolls		Horticulture		Laying sod	3. Unroll and lay sod in staggered fashion 4. Join edges firmly
c. Roll new sod	Sod roller	Injuries from roller	Horticulture		Operate roller	5. Roll oversod in a perpendicular direction
d. Water thoroughly	Water hose, sprinkler		Horticulture			6. Continue watering regularly until sod is rooted

Duty: G. Preparing And Improving Soil

Task: G112. Prepare A Compost

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Prepare compost in a bin						
a. Add layer of organic plant material	Compost bin, organic plant materials		Horticulture, chemistry, biology			1. Use plant material ONLY
b. Add lime and fertilizer if desired	Fertilizer, lime		Horticulture, chemistry, biology			2. Lime added to neutralize the acidity in the compost 3. Fertilizer promotes decomposition and improves fertility of the compost
c. Water compost	Water hose		Horticulture, chemistry, biology			4. Keep compost moist to aid decomposition
d. Repeat a, b, and c until desired level is reached	Fertilizer, lime, plant materials		Horticulture, chemistry, biology			
e. Turn compost occasionally	Pitch fork	Injuries from pitchfork	Horticulture, chemistry, biology		Use of pitchfork	5. Prevent excessive buildup of heat in compost pile

Duty: G. Preparing And Improving Soil

Task: G113. Apply Compost

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Apply compost to soil in a designated area						
a. Spread one half of the compost	Compost, rake, pitchfork		Horticulture, soil science		Use of rake, pitchfork	1. Spread evenly over surface
b. Work into the soil	Hoe, shovel or power tiller	Abrasions, cuts	Horticulture, soil science		Use of shovel, hoe or power tiller	2. Till about six inches deep
c. Spread second half of the compost	Compost, rake, pitchfork	Abrasions, cuts	Horticulture, soil science		Use of rake, pitchfork	3. Spread evenly
d. Till the soil thoroughly	Hoe, shovel or power tiller	Abrasions, cuts	Horticulture, soil science		Use of shovel, hoe or power tiller	4. Till soil until compost is evenly mixed throughout seedbed

Duty: G. Preparing And Improving The Soil

Task: G114. Prepare A Seedbed For Lawn Areas

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Prepare seedbed for a lawn						
a. Remove debris	Rake, shovel, wheelbarrow, work gloves	Abrasions, cuts	Horticulture		Use of shovel, wheelbarrow, rake	1. Stones, litter, branches, etc
b. Till area	Power tiller, gasoline, eye protection, operator's manual	Injuries from flying debris,	Horticulture,		Operation of power tiller	2. Tillage depth should be 5 to 7 inches
c. Apply lime, fertilizer	Lime, soil test results, fertilizer spreader, fertilizer		Soil science, multiplication, ratios, chemistry, division		Operation of fertilizer spreader	3. Add soil ammenments according to recommendations based on soil test
d. Till fertilizer into soil	Power tiller	Injuries from flying debris, cuts	Horticulture		Operation of power tiller	4. Mix thoroughly 5. Wait recommended length of time before planting
e. Rake the soil surface	Rake		Horticulture		Use of rake	6. Provide smooth, level seedbed

Duty: G. Preparing And Improving The Soil

Task: G115. Convert Subsoil To Topsoil

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Convert area of exposed subsoil to topsoil						
a. Till soil	Eye protection, power tiller, operator's manual, fuel	Injuries from flying debris, cuts			Operate power tiller	1. Turn and loosen the soil
b. Add the soil ammendments	Fertilizer, lime, manure, compost, rake, fertilizer spreader		Measurements, multiplication, ratios, soil science, chemistry, division		Operate fertilizer spreader	2. Add organic matter 3. Add recommended fertilizer and lime
c. Till ammendments into soil	Power tiller	Injuries from flying debris, cuts			Operate power tiller	4. Till to depth of at least 6 inches
d. Level and seed	Seed spreader, seed, rake				Use of rake, Operate seed spreader	5. Create a level seedbed 6. Seed with grass or legumes
e. Water area	Sprinkler, hose				Operate hose and sprinkler	7. Water thoroughly
f. Add mulch	Mulch, rake, pitchfork				Use pitchfork and rake	8. Add mulch to hold water and prevent erosion
g. Irrigate as needed	Sprinkler, water hose					9. Keep moist until cover crop is established

Duty: G. Preparing And Improving The Soil

Task: G116. Haul And Spread The Topsoil

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Haul and spread topsoil over a designated area						
a. Place and mark fill stakes	Wooden stakes, measuring tape, marking pen, hammer		Linear measurements		Use of hammer	1. Drive stakes at intervals throughout the area 2. Mark at depth for filling (8 to 12 inches)
b. Load wheelbarrow	Wheelbarrow, topsoil, shovel	Muscle strain			Use of shovel, wheelbarrow	3. Do NOT overload
c. Transport and deposit the topsoil over area	Wheelbarrow, topsoil	Muscle strain			Use of wheelbarrow	4. Dump loads over entire area to facilitate soil spreading
d. Spread the topsoil	Shovel or spade	Muscle strain			Use of shovel or spade	5. Use shovel or spade to distribute over area
e. Level topsoil	Shovel, rake				Use of rake	6. Use the rake to create a level, smooth surface

Duty: G. Preparing And Improving The Soil
 Task: G117. Sterilize Soil With Liquid Soil Fumigant

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Using a liquid soil fumigant, sterilize soil in an area						
a. Lay out area in 10 inch squares	Measuring tape, stick for mark-soil		Horticulture		Measuring and marking area	1. Measure and mark the soil
b. Punch a hole in each square	Shovel or stake		Horticulture		Punching holes	2. Six inches deep in center of square
c. Pour fumigant into each hole and cover	Rubber gloves, fumigant, measuring device	Toxicity of chemicals	Horticulture, chemistry	Ability to read and interpret chemical label	Measuring and pouring the chemicals	3. Pour recommended amount, carefully measured 4. Cap hole with soil
d. Sprinkle the fumigant on entire area	Sprinkling can, rubber gloves, water	Toxicity of chemicals	Horticulture, chemistry	Ability to read and interpret chemical label	Measuring and pouring the chemicals	5. Use recommended amount
e. Cover area	Plastic sheets, water hose	Toxicity of chemicals	Horticulture, chemistry	Ability to read and interpret chemical label	Laying plastic or watering	6. Cover with plastic or, if recommended, wet soil surface

Duty: G. Preparing And Improving Soil

Task: G118. Sterilize Soil With Granular Or Powdered Chemicals

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Use a granular or powdered chemical to sterilize the soil in a given area						
a. Till the area	Power tiller or tractor, hoe, tillage equipment	Eye injuries from flying debris, cuts, abrasions			Machine operation	1. Loosen the soil 2. Provide smooth, uniform surface
b. Broadcast the chemical	Granular soil, respirator, spreader, fumigant	Toxicity of chemical	Multiplication, ratios, division	Ability to read and interpret chemical label	Operation of spreader	3. Spread at the recommended rate 4. Broadcast in a uniform coverage
c. Till material into the soil	Tillage equipment	Toxicity of chemical, eye injuries, cuts and abrasions			Machine operation	5. Till to depth recommended on chemical label

Duty: G. Preparing And Improving Soil

Task: G119. Aerate The Sod

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Use an aerator to aerate lawn area						
a. Set up the equipment	Aerator, fuel, oil, wrenches, operator's manual		Mechanics	Ability to read and interpret operator's manual	Use of wrenches and other common tools	1. Perform any preliminary maintenance as specified in manual 2. Adjust for proper depth of penetration
b. Determine the direction of travel			Horticulture			3. Plan most efficient route
c. Cover area with aerator	Aerator, eye protection, hard shoes or boots	Foot injuries, eye injuries from flying debris	Horticulture		Operation of machinery	4. Overlap slightly with each pass
d. Clean tines as necessary	Aerator		Mechanics		Cleaning the machinery	5. Keep machine free of branches, sod clumps, sticks, etc
e. Replace tines as needed	Replacement tines, wrenches		Mechanics		Use of wrenches and other common tools	6. Follow directions in manual

Duty: G. Preparing And Improving Soil

Task: G120. Apply Fertilizer By The "Punch Bar" Method

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Fertilize the designated trees using the punch bar method						
a. Punch holes in the soil around tree	Soil probe or punch bar	Abrasions, cuts			Punching holes	1. Holes should be two inches in diameter, at least 12 inches apart, 2 feet outside the drip line of the tree
b. Determine the amount of fertilizer	Fertilizer recommendations, fertilizer label, calculator		Multiplication, measurements, division		Measuring the fertilizer	2. Use recommendations based on soil test and the fertilizer label to determine amount
c. Pour fertilizer into the holes	Fertilizer				Measuring the fertilizer	3. Use equal amount in each hole
d. Cap holes	Soil				Filling holes	4. Cover with soil, sod if needed

Duty: G. Preparing And Improving Soil

Task: G121. Control Soil Erosion Caused By Water

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Use 1 or more of following methods to control water erosion in given area						
a. Plant cover crops	Seed, spreader, fertilizer		Horticulture, soil science		Operate seed or fertilizer spreader	1. Use fast growing and soil holding plants (grasses or legumes) 2. Fertilize as is needed
b. Rotate crops	Seed, spreader, fertilizer		Horticulture, soil science		Operate seed or fertilizer spreader	3. Use cool season or warm season plants for year round coverage
c. Construct terraces	Power equipment, stones or railroad ties, shovels	Injuries from heavy machinery	Horticulture, soil science		Operate heavy equipment	4. Reduce slope
d. Construct artificial barriers	Power equipment, stones or railroad ties, shovels	Injuries from heavy machinery	Horticulture, soil science		Operate heavy equipment	5. Use barriers to stop or channel flow of water
e. Sod waterway	Sod		Horticulture, soil science		Lay sod	6. Use sod to slow flow of water and trap soil particles
f. Construct cross drainage ways	Power equipment, shovels	Injuries from heavy machinery	Horticulture, soil science		Operate heavy equipment	7. Channel water across slope

Duty: G. Preparing And Improving Soil

Task: G122. Control Soil Erosion Caused By Wind

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Use 1 or more of following methods to control wind erosion in area						
a. Sod area	Sod, roller		Horticulture, soil science		Lay sod, operate roller	1. Fertilize and water as needed 2. Sod will hold soil in place
b. Furrow soil	Tractor, plow	Injuries from machine operation	Horticulture, soil science		Tractor driving	3. Deep furrows deflect wind & trap soil particles
c. Rotate cover crops	Seed plantor	Injuries from seed plantor	Horticulture, soil science		Operate plantor	4. Keep year round cover on soil
d. Mulch area	Mulch, rake, pitchfork	Abrasions, cuts	Horticulture, soil science		Use pitchfork and rake	5. Much holds moisture in soil and protects the soil from erosion
e. Plant tree or shrub windbreaks	Shovels, trees or shrubs	Abrasions, cuts	Horticulture, soil science		Using shovels, planting trees	6. Windbreaks reduce wind velocity 7. Plant close hedge of trees or shrubs
f. Construct fencing	Posts, posthole diggers, nails, fencing	Abrasions, cuts	Horticulture, soil science		Use posthole diggers, hammer	8. Specialized solid fence for windbreak 9. Locate windward of field
g. Plant strip covers	Seed, plantor	Abrasions, cuts	Horticulture, soil science		Operate plantor	10. Tall grass or other plants 11. Rows planted perpendicular to wind direction

Duty: H. Maintaining Equipment

Task: H123. Clean And Sharpen Hand Tools

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Clean and sharpen a hoe and shovel						
a. Clean rust or any foreign material from tool	Hoe or shovel solvent, wire brush	Toxicity of solvent, cuts, abrasions			Use of wire brush	1. Use solvent and electric or hand wire brush
b. Clamp tool securely in vise	Hoe or shovel vise				Use of vise	2. Clamp handle of tool
c. Remove gaps or nicks from cutting edge	Hoe or shovel, vise, hand file	Abrasions, cuts			Use of file	3. Use hand file 4. Grip file firmly and use short strokes to avoid injuries
d. Sharpen edge	Hoe or shovel, hand file or grinding wheel, eye protection, vise	Abrasions, cuts, eye injuries if using grinding wheel			Use of file or grinding wheel	5. Use hand file or grinding wheel 6. Maintain original bevel

Duty: H. Maintaining Equipment

Task: H124. Replace Handles For Tools

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Replace broken handle on tool						
a. Secure tool in a vise	Tool, vise				Use of vise	
b. Remove old handle.	Tool, vise, screwdriver, hammer				Working handle from tool	1. Do NOT heat tool to loosen handle, as heat can destroy metal temper
c. Fit a new handle to tool	Hammer, glue, sandpaper,				Tool fitting	2. Place handle in tool for trial fit 3. Remove handle and finish fitting
d. Place the handle in tool	Hammer, glue, wedge				Tool fitting	4. Use soft wooden wedge to hold handle tightly
e. Treat the handle	Linseed oil				Applying oil to wood	5. Treat with boiled linseed oil

Duty: H. Maintaining Equipment

Task: H 125. Repair Leaking Faucets

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Repair a leaking water faucet						
a. shut off water at source						
b. disassemble faucet	screw driver, wrench, knife	cuts			use of screw driver, wrench and knife for prying cap	1. Remove cap of faucet 2. Remove stem from body of faucet 3. Remove screw that holds seat washer
c. dress washer seat if needed	seat dressing tool, knife				use of seat dressing tool	4. Use seat dressing tool 5. Clean out any mineral deposits, etc.
d. replace seat washer and screw	new seat washer, screw driver				fitting washer, use of screw driver	6. Use of new washer of proper size 7. Tighten to snug position without compressing washer
e. reassemble faucet	screw driver, wrench				use of screw driver, wrench	8. Replace stem in faucet 9. Replace faucet cap 10. Turn on water and check for leaks

Duty: H. Maintaining Equipment

Task: H 126. Repair Extension Cords

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Repair a socket						
a. remove old socket	screwdriver pliers	electrocution be sure that cord is disconnected	electricity, physics		use of screwdriver	1. Remove screws and separate pieces of socket housing
b. prepare cord	knife, wire cutter, electrical tape		"		use of wire cutters	2. Trim ends of cord 3. Remove outer insulation 4. Run cord through socket 5. Tie holding knot if possible
c. secure wires to terminal screws	screwdriver, knife, electrical tape		"		use of screwdriver	6. Trim insulation from wire ends 7. Hook around terminal screws 8. Tighten securely 9. Follow color codes
d. reassemble socket	screwdriver		"		"	10. Secure wires or ends of socket with screw if applicable 11. Reassemble housing

Duty: H. Maintaining Equipment

Task: H 127. Sharpen Rotary Mower Cutting Blade

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Sharpen and balance a rotary cutting blade						
a. adjust blade	grinder, operators manual			ability to read and interpret operators manual	operation of grinder-balancer	1. Position blade guide approximately $1\frac{1}{2}$ inches ahead of grinding wheel spindle
b. raise grinding wheel into position	"			"	"	2. Raise wheel so that it cleans mower blade
c. hold blade in position for grinding	rotary mower blade, grinder operators manual	cuts		"	"	3. Hold firmly in both hands 4. Stand to right-hand side of grinder
d. turn on motor and lower wheel to begin grinding	mower blade, grinder, safety glasses, work gloves	cuts, eye injuries	calculate angles	"	"	5. Wear safety glasses 6. Grind to original bevel (28 to 32 degrees)
e. move blade from side to side	"	"	"	"	"	7. Repeat for both ends of blade
f. check and correct balance of blade	grinder-balancer, mower blade, safety glasses	"		"	"	8. Place on step cone of balancer 9. Use grinder to remove metal from back side of appropriate end of blade

Duty: H. Maintaining Equipment

Task: H 128. Replace Cutting Blade on a Power Scythe

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Replace a cutting blade on a power scythe						
a. lock blade	power scythe, replacement blade, wrenches, screwdriver, operators manual	cuts, abrasions		ability to read and interpret operators manual	use of wrenches, screwdriver	1. Use method recommended in manual
b. remove not holding blade	"	"		"	"	2. Use proper size wrench
c. replace blade	"	"		"	"	3. Teeth or cutting edges pointing clockwise

Duty: H. Maintaining Equipment

Task: H 129. Service Rotary Blade Grinder-Balancer

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Perform routine maintenance on a rotary blade grinder-balancer						
a. lubricate motor	grinder operators manual, grease gun, oil		mechanics	ability to read and interpret operators manual	use of grease gun	1. Lubricate as specified by manufacturer
b. adjust V-belt	wrenches, spring scale, ruler		measuring tension		use of wrenches, spring scale	2. Adjust to recommended tension 3. Replace if badly worn
c. adjust pivot joint of grinding head arm	wrenches		mechanics		use of wrenches	4. Remove looseness in pivot
d. adjust grinding wheel depth control stop	"		"		"	5. Increase drag on control 6. Prevent rotation during grinding
410						411

Duty: H. Maintaining Equipment

Task: H 130. Clean Centrifugal Fertilizer Applicators

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Clean a centrifugal fertilizer spreader						
a. wash spreader	centrifugal fertilizer spreader, water hose, detergent				using hose, scrub brush	1. Wash with water and detergent
b. check for fertilizer residue	spreader				"	2. Check carefully for caked on fertilizer
c. scrub to remove undissolved fertilizer	spreader, scrub brush, detergent				"	3. Scrub with brush
d. rinse thoroughly	spreader, water hose				"	4. Hose and fresh water
e. dry thoroughly	towel				"	5. Towel and air dry
f. oil or grease gears	oil or grease				"	6. Coat with oil to prevent corrosion

Duty: H. Maintaining Equipment

Task: H 131. Lubricate Vacuum Rakes

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Lubricate a vacuum rake						
a. select lubricants	vacuum rake, operators manual, grease, grease gun, oil brush, clean rag			ability to read and interpret operators manual		1. Grease type and oil wt. as recommended in operators manual
b. add oil in gear box	"				measuring and pouring oil	2. Fill only to recommended level
c. oil drive chains	"				oiling chain	3. Oil entire length of chain
d. grease drive shaft	"				using grease gun	4. Inject enough grease to force old grease from fittings
e. grease couplings	"				"	5. Wipe fittings clean before and after injecting grease

Duty: H. Maintaining Equipment

Task: H 132. Lubricate Centrifugal Fertilizer Applicators

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Lubricate a centrifugal fertilizer spreader						
a. locate lubrication points	centrifugal fertilizer spreader, operators manual			ability to read and interpret operators manual		1. Use operators manual locate all points
b. determine type of lubricant	operators manual			"		2. Refer to operators manual 3. Consider operating conditions
c. lubricate each fitting	fertilizer spreader, grease gun, grease, clean rag			"		4. Wipe fitting clean 5. Pump sufficient grease force old grease from fitting 6. Wipe away old grease

Duty: H. Maintaining Equipment

Task: H 133. Lubricate a Tractor

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Lubricate a tractor						
a. locate lubrication points	tractor, operators manual			ability to read and interpret operators manual		1. Refer to operators manual for location of points
b. determine proper lubricants	"			"		2. Determine type of fittings or openings 3. Refer to manual for proper lubricants for various points
c. lubricate each point	tractor, grease gun, lubricants, clean rag			"	use of grease gun	4. Wipe off fitting before lubricating 5. Do not overfill fittings with rubber dust cover

Duty: H. Maintaining Equipment

Task: H 134. Add Oil in Small Engines

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Add oil in a small engine						
a. operate engine until warm	small gasoline engine, fuel			ability to read and interpret operators manual	operation of small engine	1. Run until normal operating temperature is reached
b. check oil	"			"	measuring oil level	2. Remove oil fill plug to check level or use dipstick if appropriate
c. add oil to crankcase	small engine, operators manual, engine oil			"	pouring oil	3. Use oil recommended in manual 4. Never overfill crankcase
d. replace plugs or covers	"			"		5. Tighten well to exclude dust

Duty: H. Maintaining Equipment

Task: H 135. Change Engine Oil

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Change the oil in a four-cycle engine						
a. operate engine until warm	4-cycle engine fuel, operators manual			ability to read and interpret operators manual	operation of engine	1. Run until normal operating temperature is reached
b. disconnect spark plug wire	"	electrocution		"	removal of wires	2. Wires disconnected as safety precaution
c. drain oil	wrench			"	use of wrench	3. Remove cap 4. Allow oil to drain into pan
d. clean or replace oil filter	oil filter tool, new filter			"	"	5. Remove filter or element 6. Clean or replace as appropriate 7. Do not crimp gasket
e. replace drainplug	wrench			"	"	8. Tighten securely without damaging threads
f. refill crankcase	motor oil			"	pouring oil	9. Use recommended type and amount of oil
g. connect plug wires				"	reconnecting wires	10. Connect in proper sequence
h. start engine				"	operation of engine	11. Allow to idle
i. check for leaks				"		12. Check drain plug and filter for leaks

Duty: H. Maintaining Equipment con't

Task: H 135. Change Engine Oil

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
j. stop engine and check oil level				"	measuring oil level	13. Allow oil to settle before checking level

Duty: H. Maintaining Equipment

Task: H 136. Check Tires for Pressure, Wear and Defects

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Check tractor tires for pressure, wear and defects						
a. jack up tractor	tractor, jack, blocks	injuries from tractor falling off of jack			use of jack	1. Raise wheels off ground to permit rotation
b. measure pressure	pressure guage				use of pressure guage	2. Use standard or liquid pressure guage as appropriate 3. Measure with valve at top with liquid filled tire
c. inflate if needed	air pump				use of air pump	4. Inflate to recommended PSI
d. visually inspect tires						5. Check for tread and sidewall cuts, fabric breaks, rubber cracks, stubble wear, valve damage, tread wear or faulty stems

Duty: H. Maintaining Equipment

Task: H 137. Replace Spark Plugs in Tractors

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Change the spark plugs in a tractor						
a. disconnect spark plug wires	tractor, operators manual		mechanics	read and interpret operators manual	disconnecting wires	1. Keep track of connecting sequence
b. clean area around plugs	clean rag		"		cleaning engine	2. Wipe grime and debris away from plug holes
c. remove spark plugs	spark plug wrench		"		use of spark plug wrench	3. Loosen and remove carefully using plug wrench
d. set gap on each new plug	spark plugs, wire feeler, guage, gap setting tool, gap specifications		"		use of feeler guage, gap setting tool	4. Use wire feeler guage to check gap. 5. Set gap as specified by manufacturer
e. install new plugs	spark plugs, torque wrench		"		use of torque wrench	6. Screw plugs in by hand, making sure they are aligned 7. Tighten using torque wrench as specified
f. reconnect plug wires					connecting plug wires	8. Connect in proper sequence

Duty: H. Maintaining Equipment

Task: H 138. Replace Breaker Points on a Tractor

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Replace the breaker points on a tractor						
a. clean outside of distributor	tractor, operators manual, clean rag		mechanics	ability to read and interpret operators manual	cleaning distributor	1. Wipe dust and grime away from distributor cap
b. remove distributing cap	screw driver		"			2. Remove carefully 3. Check for cracks
c. remove breaker arm and spring	"				use of screw driver	4. Remember proper position for reinstallation
d. remove stationary point and bracket	"		"		"	
e. clean and lubricate cam	clean rag, oil		"		cleaning and applying oil	
f. replace points	new breaker points, screw driver				use of screw driver	5. Reverse order used to remove points
g. set point gap	feeler gauge, screw driver, or dwell meter				use of feeler gauge or operation of dwell meter	6. Turn cam to position breaker arm in highest position 7. Loosen lock screw 8. Open points to specified gap 9. Set gap using feeler
430						431

Duty: H. Maintaining Equipment

Task: H 138. Replace Breaker Points on a Tractor

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
h. replace distributor cap						guage 10. Dwell meter can be used to set points

Duty: H. Maintaining Equipment

Task: H 139. Replace Radiator Hoses

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Replace a radiator hose on a tractor						
a. drain cooling system	tractor, wrench, water hose				use of wrench	1. Remove plug and flush system
b. remove old hose	screw driver				use of screw driver	2. Loosen hose clamps to remove hose
c. clean radiator neck	knife				use of knife for removal of deposits	3. Scrape away any buildup of rust or minerals
d. install new hose	radiator hose, hose clamps, hose dressing, screw driver				use of hose clamp screwdriver	4. Hose dressing can be used on ends 5. Replace hose clamps if needed 6. Tighten hose clamps
e. refill radiator	engine coolant					7. Refill with coolant 8. Start engine and check for leaks

Duty: H. Maintaining Equipment

Task: H 140. Service Carburetor Air Cleaner on Small Engines

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Service the carburetor air cleaner on a small gas engine						
a. disconnect spark plug wire		electrocution			disconnecting wire	1. Disconnect wire as a safety precaution
b. remove air cleaner cover	screwdriver, clean rags				use of screwdriver	2. Clean area around air cleaner before removing cover
c. clean cover and filter element	clean rags, solvent, oil, wash container				cleaning with solvent and rags	3. Cover air intake opening with a clean rag 4. Most small engines have oil-saturated elements that can be easily cleaned
d. clean intake openings	clean rags				"	5. Check for clogging 6. Wipe clean with rag
e. replace air cleaner assembly					assembling air cleaner	
f. reconnect spark plug wire					reconnecting wires	

Duty: H. Maintaining Equipment

Task: H 141. Adjust Engine Idle speed on Small Engines

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Adjust the engine idle speed on a small engine						
a. check governor for bent links and wear	small engine, operators manual		mechanics	ability to read and interpret operators manual		1. Refer to operators manual 2. Repair as necessary
b. determine recommended idle speed	"		"	"		3. Most small engines have idle speed stop screw
c. start engine	"		"	"	operation of small engine	
d. adjust tension on governor spring	screwdriver		"	"	use of screwdriver	4. Adjust to maintain desired speed

Duty: H. Maintaining Equipment

Task: H 142. Service Belt Drives on Groundskeeping Equipment

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Service belt drives on groundskeeping equipment						
a. determine type and proper position of belt	belt driven equipment, operators manual		mechanics	read and interpret operators manual		1. Refer to operators manual 2. Types include flat belts, V-belts, round belts
b. check for signs of improper installation	"		"	"		3. Belt stretches beyond take-up, fails no visible reason, turns over, is cut on the bottom creeps or slips
c. check pulleys	wrenches, screw driver, oil		"	"	adjusting pulleys	4. Smooth or adjust as needed
d. check alignment and tension	spring scale, ruler, wrenches		"	"	use of spring scale, adjusting tension	5. Adjust to specifications
e. clean belt	solvent, clean rags, belt dressing		"	"	cleaning	6. Remove oil and grease with solvent 7. Apply belt dressing if recommended
f. clean shields and screens	solvent, rags			"	"	

Duty: H. Maintaining Equipment

Task: H 143. Service Chain Drives on Groundskeeping Equipment

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Service Chain drives on groundskeeping equipment						
a. determine type of chain	chain driven equipment, operators manual		mechanics	ability to read and interpret operators manual		1. Refer to operators manual 2. Types include plain, roller and silent
b. remove connector link and clean chain	screw driver, hammer, solvent, chain lubricant		"		removal of connecting link washing chain	3. Clean chain in solvent 4. Lubricate as needed
c. clean sprockets	brush, solvent, chain lubricant		"		cleaning, applying lubricant	5. Driven socket, driver socket and adjustable idler socket 6. Clean with brush & solvent
d. reinstall chain	hammer, screwdriver		"		installing chain securing connecting link	7. Wrap chain around sprockets, bring free ends together on one. Sprocket, install connecting link
e. adjust chain tension	wrenches, screwdriver		"		adjusting idler sprocket	8. Use adjustable idler sprocket to change tension

Duty: H. Maintaining Equipment

Task: H 144. Service Gear Drives on Groundskeeping Equipment

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Service gear on groundskeeping equipment						
a. determine proper lubricant	gear driven equipment, operators manual		mechanics	ability to read and interpret operators manual		1. Refer to operators manual
b. lubricate gears	lubricant, brush, squirt can		"	"	pouring or brushing oil	2. Open gears can be lubricated by: splash pan, hand lubrication with brush or squirt can, drip oiler
c. check condition of gears			"	"		3. Look for cracks, excessive wear or breaks
d. replace parts as necessary	wrenches, replacement parts		"	"	use of wrenches, other tools to service gears	

Duty: H. Maintaining Equipment

Task: H 145. Service Variable Speed Drives on Groundskeeping Equipment

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Service variable speed drives on groundskeeping equipment						
a. determine type of drive	variable speed groundskeeping equipment, operators manual		mechanics	ability to read and interpret operators manual		1. Refer to operators manual
b. clean parts	solvent, rags, oil		"		cleaning	2. Use proper solvent clean rags
c. lubricate as necessary	lubricant		"		pouring oil	3. Use recommended type and quantity of lubricant
d. adjust tension	wrenches		"		use of wrenches for adjusting gears, etc.	4. Refer to operators manual

Duty: H. Maintaining Equipment

Task: H 146. Prepare Equipment for Painting

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Prepare a piece of groundskeeping equipment for painting						
a. clean surface	groundskeeping equipment, rags, solvent, wire brush, respirator	toxicity of paint dust			cleaning	1. Remove any grease, old paint, or rust from area to be painted
b. straighten dents	rubber hammer, filler material				straightening dents in metal	2. Hammer out or fill in dents
c. sand surface	power sander, sand paper	toxicity of paint brush			sanding operating power sander	3. Use orbital power sander or by hand
d. mask borders	masking tape, paper				applying masking tape	4. Mask any chrome, glass, etc.
e. prime surface	primer, spray painting equipment brushes, respirator	toxicity of primer		ability to read primer label	painting	5. Use recommended primer
f. set up equipment for painting	painting equipment					6. Set up in dry, sheltered area

Duty: H. Maintaining Equipment

Task: H 147. Paint Equipment

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Apply two coats of paint to a piece of groundskeeping equipment						
a. determine appropriate paint	groundskeeping equipment, paint, operators manual			ability to read and interpret paint labels		1. Refer to paint labels, equipment manuals, etc.
b. set up painting equipment	paint gun, paint, respirator	toxicity of paint			setting up and operating spray gun	2. Adjust paint gun pressure 3. Thin paint if needed 4. Fill paint gun through strainer 5. Turn on exhaust system 6. Adjust paint gun
c. paint equipment	paint gun, paint, respirator	"			operating spray gun	7. Hold gun nozzle 6 to 8 inches from surface 8. Use back and forth motion over area until covered 9. Wear respirator
d. clean up	rags, turpentine	"			cleaning	10. Use rag to remove paint from areas not to be painted 11. Clean paint gun using turpentine 12. Store paint and supplies

Duty: H. Maintaining Equipment

Task: H 148. Clean and Oil Electric Motors

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Clean and lubricate an electric motor						
a. remove shields and covers	electric motor, screwdriver, wrenches, operators manual		mechanics	ability to read and interpret operators manual	use of wrenches and screwdriver	1. End shield and other covers removed to provide access to interior
b. clean interior	rags, vacuum or compressed air hose		"	"	use of vacuum or compressed air for cleaning	2. Use vacuum or compressed air to clean dust from interior 3. Clean commutator, if applicable
c. lubricate bearings	oil or grease, clean rags		"	"		4. Oil bearings if applicable 5. Pack bearings if applicable
d. replace shields and covers	screwdriver, wrenches		"	"	use of wrenches and screwdriver	6. Attach shields securely

Duty: H. Maintaining Equipment

Task: H 149. Order Repair Parts for Vehicles or Other Equipment

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Order repair parts for groundskeeping machinery						
a. secure necessary information	machinery, operators manual			read and interpret operators manual		1. Make model number and descriptive name of machinery
b. contact parts distributor	parts catalog, telephone			read and interpret parts catalog		2. Part names, numbers and descriptions
c. obtain price	"		addition, subtraction	communicate over telephone		3. Give appropriate information on needed part
d. order parts	"			fill out order forms		4. Compare prices between sources

SUPPLEMENT B

APPENDIX I

TASK ANALYSIS

LANDSCAPE OPERATIONS

STUDENT OCCUPATIONAL COMPETENCY ACHIEVEMENT TESTING
ENTRY LEVEL SKILLS

LANDSCAPE OPERATIONS

- A. Identify Landscape Plants
 - 1. Identify Landscape Plants
- B. Designing Landscapes
 - 2. Analyze residential site for Landscape Purpose
 - 3. Analyze residential site for family preference
 - 4. Analyze site for soil types
 - 5. Design Public Area
 - 6. Design outdoor privacy area
 - 7. Design service area
 - 8. Design flower garden
 - 9. Design a vegetable garden for service area
 - 10. Design garden equipment storage
 - 11. Design outdoor play area
 - 12. Design for off-site factors
 - 13. Design circulation structures
 - 14. Design Outdoor Lighting System
 - 15. Design drainage system
 - 16. Estimate cost of landscape proposal
- C. Designing and Maintaining Interior Plantscape
 - 16. Analyze site
 - 17. Designing Interior Plantings
 - 18. Selection of plant materials and supplies
 - 19. Establishment of Plants
 - 20. Maintaining Interior Plantscape

- D. Interpret laws regulating the landscape industry
 - 21. Interpret laws regulating the landscape industry
- E. Demonstrate leadership, employability, communication and human relation skills
 - 22. Prepare planting instructions on balled and burlap stock and on container stock
 - 23. Taking phone orders and writing customer orders
 - 24. Provide verbal information on care of evergreen trees and deciduous house plants
 - 25. Follow up landscape project
 - 26. Aid customer in the selection of tree or shrub, flowering and house plant
 - 27. Fill customer order for plants and merchandise
 - 28. Demonstrate use of spreader
 - 29. Describe purpose and quality of merchandise

Duty: A Identify Landscape Plants

Task: A 1. Identify Landscape Plants

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Identify a selection of landscape plants according to: A. plant classification B. types of inflorescence C. leaf characteristics D. fruit and seeds	Manual of flora of the area hand lens		Ornamental Horticulture		visual	A. Family Genus Species Common names B. spike raceme pavile head, etc. C. leaf arrangement opposite alternate whorled - simple or compound - leaf shape ovate spatulate cordate, etc. - leaf surface glacous glabrous ciliate, etc. D. drupe berry pome Samara, etc.

Duty: B Designing Landscapes

Task: B 2. Analyze residential site for Landscape Purpose

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Develop a list of landscape recommendations based on the following analysis of a residential site:	Selected residential site, plot plan, soil test, weater data, pencil		Landscape Architecture			
A. physical features at the site	Soil analysis report reference material					A. topography, drainage existing vegetation structure, walkways drives-utilities
B. soil analysis			Soil Science Horticulture	reading		B. major elements, minor element, pH, soil texture, organic matter
C. weather data (macro and microclimates)				reading		C. temperature, precipitation, humidity, winds, sun/shade
D. off-site views						D. natural features - bodies of water, rocks, slopes
E. site measurement	Tape measure or measuring wheel		Math			E. foundations, windows, door vents, drain air conditioners
F. clients ideas and desires				verbal		F. cost of maintenance installation, level of installation

Duty: B. Designing Landscapes

Task: B3. Analyze residential site for family preferences

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Develop a site plan according to family preferences for the public, private and service areas						
A. Determine family outdoor needs and desires	Selected residential site			Verbal		A. Maintenance level costs
B. Determine the recreation needs	Residing family members			Verbal		B. Outdoor cooking areas, sports areas, vegetable gardens, pool
C. Determine the service needs	Sketch pad, pencil, tape measure, or measure wheel			Verbal		C. Trash containers, clothes lines, compost, lawn and garden, storage
D. Determine family aesthetic desires	Sketch pad, pencil, tape measure, or measure wheel			Verbal		D. Flower borders, planter boxes, shade, fencing
E. Identify public, private, and service areas				Verbal		

Duty: B. Designing Landscapes

Task: B4. Analyze site for soil types

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Develop recommendations for improvements of soil based on soil tests	Selected landscape site, shovel, soil probe, paper, pencil, soil sample kit					
A. Amount of top soil present			Soil science	Reading		1. Choose several locations at the site
B. Presence of organic matter						2. Probe into six (6) inches of the soil taking soil samples from various locations
C. Soil texture						3. Can analyze soil at the Cooperative Extension Service
D. Soil drainage						
E. Soil fertility						
F. Soil pH						

Duty: B. Designing Landscapes

Task: B5. Design public area

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Develop site plan to compliment the public area based on the following considerations:	Plot plan of residential property, drawing pencil, tracing paper, triangle, t-square, template					
A. Family preference						1. Maintenance level cost
B. Off site factors			Landscape architecture	Verbal		2. Views, noise, dust, pedestrian traffic
C. Foundation planting						3. Prepare planting plans to include A through E
D. Planting which provides: framing, view control, aesthetic needs, privacy from street, shade			Ornamental horticulture			4. Turfgrass, grass varieties suitable to sunlight, shade, salt tolerance
E. Lawn grasses			Turfgrass			

Duty: 3 Designing Landscapes

Task: 36 Design outdoor privacy area

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Design a landscape plan for the privacy area based on the following considerations:	Selected residential site, tracing paper, t-square, triangle, template, drawing pens		Landscape Architecture	verbal		A. maintenance level, cost of installation, and maintenance
A. family preference			Ornamental Horticulture			B. views, noise, dust, pedestrian traffic
B. off-site factors						C. height of a wire/wood fence
C. fencing and plowing for privacy						D. lawn games, swimming pool, patios, terraces, tables, umbrellas, outdoor cooking
D. surfaces and lighting for entertainment and recreation						E. annuals perennials
E. flower beds			Floriculture			
F. shade providing trees						
G. plants to meet aesthetic needs						

Duty. B. Designing Landscapes

Task: B7. Design service areas

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Design a landscape plan for service area based on:	Tracing paper, drawing pencil, measuring tape, measure wheel, selected residential site, t-square, triangle, template					
A. Service items to include in the service area			Measurement			1. Vegetable garden, trash containers, clothes lines, compost storage sheds
B. Adequate size of accessibility						
C. Suitable plants or screening materials to separate service area from other areas						2. Fencing materials, hedge materials
D. Landscape standards						
E. Client's approval of plan and cost			Verbal			3. Cost estimates, maintenance level, installation cost
471						472

Duty: B Designing Landscapes

Task: B8. Design flower garden

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Design a landscape plan for a flower garden based on the following considerations: A. client's desire for flower garden B. suitable location C. types of flowers D. style of flower garden E. size of garden F. types and numbers of plants needed G. client preferences	note pad graph paper tracing paper t-square template drawing paper selected site		Ornamental Horticulture Floriculture Soils Landscape Architecture	verbal		A. maintenance time cost of installation and maintenance B. hours of exposure to sun soil drainage fertility wind water source C. formal informal planters, beds D. color, height spacing, sun/shade tolerance annual, perennial

Duty: B Designing Landscapes

Task: B9. Design a vegetable garden for service area

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Design a landscape plan for a vegetable garden based on the following considerations: A. suitable location and soil fertility B. client preference C. indicate vegetable spacing distances and preparation D. indicate planting dates for all vegetables on the plan to provide desired harvesting season. E. indicate care instructions	graph paper tracing paper t-square template drawing pencil residential site		Soil Science Vegetable Crops	verbal		A. hours of exposure to sun - soil drainage - distance from water source - wind exposure B. amount and types of vegetables consumed by client C. rows, hills, mounts, mulching E. provide instruction for watering, fertilizing, weed control, pest control, staking, harvesting

Duty: B Designing Landscapes

Task: B10. Design garden equipment storage

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Design a garden equipment storage area meeting landscape standards	Residential landscape site, sketch pad, tracing paper, t-square, template		Landscape Architecture Ornamental Horticulture Carpentry Math skills			
1. determine amount and kind of equipment						1. lawn mowers, deck chairs and pillows, edgers, outdoor cooking grill
2. determine area needed and select location for garden storage						2. area needs to accomodate size of equipment and movement
3. select plant materials						3. screening material or compliment facility
4. obtain client approval						4. maintenance level and . . cost of installation

Duty: B Designing Landscapes

Task: B11. Design outdoor play area

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Design a outdoor play area providing for maximum safety, and meeting landscape standards: 1. collect family data 2. determine equipment to be included 3. determine amount of space needed or desired for play 4. select suitable site 5. client preference	Residential site, plot plan, tape measure or measure wheel, sketch pad, tracing pad, drawing pencil		Landscape Architecture Horticulture Math skills Measurement	verbal		1. number and ages of children 2. climbing ropes, sand boxes, swings, slides, wading pool, play house 4. soft surface, shade 5. cost installation, screening or fencing, maintenance level
479						480

Duty: B **Designing Landscapes**

Task: B12. Design for off-site factors

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Design a landscape plan for off-site factors based on the following considerations: 1. enhance desirable views 2. screen undesirable views 3. reduce noise and dust infiltration 4. control pedestrian 5. create privacy 6. client desires, needs	Residential landscape site, plot plan, tracing paper, t-square, template, drawing pens, plan material list		Horticulture Landscape Architecture	verbal		1. natural water features - rock outcropping - slopes 2. utility transformer, air conditioner, neighbors drive and garage 3. neighbor's air conditioner exhaust fumes, well pump noise, dust from unpaved access road 6. maintenance level and cost, installation cost

Duty: B. Designing Landscapes

Task: B13. Design circulation structures

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Design circulation structures providing for convenient movement of people and vehicles on the property	Residential landscape site, tracing paper, drawing pencil, triangle, template, t-square					
1. Identification of the major entrances and activity centers			Landscape architecture, Construction			1. Front door, garage, service and rear entrances, entrance to courtyard, pool, patio, porch
2. Identification of the primary physical elements on site plan						2. House, garage, deck, patio, pool, pond, fencing, terrace
3. Plan route to link elements and accommodate pedestrians						3. Provide access from public street to front door with a driveway, curbs, paths, ramps, or steps
4. Determine width of walks/paths and select the surface materials to be used						4. Wood chips, gravel, flagstone, brick
5. Determine the client's needs and preferences				Verbal		5. Need for wheelchair accessibility: ramp, hard surface, cost of installation, maintenance level and cost

Duty: B. Designing Landscapes

Task: B14. Design outdoor lighting system

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Design a lighting system to provide maximum security of property and highlight landscape plants	Residential landscape site, tracing paper, drawing pencil, triangle, template, t-square					
1. Determine family lighting needs: a. safety b. aesthetic c. security			Landscape architecture, Electrical			1. Illuminate walks, drives, patios, work, recreation, and entertainment areas
2. Determine the quantity and quality and height of illumination						2. Flood lights, spot lights, flourescent lights
3. Client's preferences				Verbal		3. Client's desire to create dramatic garden effects, functional lighting, safety lighting, installation cost, and utility costs

Duty: B. Designing Landscapes

Task: B15. Design drainage System

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Design a drainage system on a plot plan with depth spacing & gradient meeting landscape standards:	Selected landscape site, plot plan, tracing paper, drawing pencil, t-square, triangle, template		Landscape architecture Math			
a. Survey site to establish grade levels						1. Determine if grade is 0-5', 5'-10' or 10'+
b. Determine if any drainage system exists						2. Storm sewers, rain gutters, roadside ditch
c. Plan location and arrangement for drainage lines						3. Indicate location of main and lateral drains
d. Select tile						3. Clay, concrete, PVC
e. Plan main outlet						

Duty: B Designing landscapes

Task: B16. Estimate cost of landscape proposal

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Prepare an estimate of the cost of landscape proposal to include: - total number of plants and cost/plant - cost of sod - cost of installing material - cost of construction materials - fee for designing landscape - determine terms of payment - submit proposal to client	Complete landscape drawing, local labor costs, product catalog, price lists, calculation paper, pencil		Landscape Architecture Horticulture Math Skills Turfgrass			- List number of plants, species, description, and cost - Obtain data on local labor costs - Include cost of: - fencing material - mulch - landscape timbers - sprinkler system - landscape lighting - walkway materials - Hours spent designing and researching plan - Deposits, installment payment, charge

Duty: C. Designing and Maintaning Interior Plantscape

Task: C16. Analyze site

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Make a visual and physical analysis of interior site of landscape to include: a. Dimensions of site b. Light source c. Availability of water d. The type of plantings e. Customer preference	Selected interior site, paper, pen, pad, measuring tape or wheel, light meter		Ornamental horticulture Landscape design	Verbal	Reading Visual	1. Existence of walkway, record height, width and depth of existing beds 2. Measure the light intensity & source (artificial or natural source) 3. Indicate locations of faucets & existence of sprinklers in beds 4. Container use direct planting in beds 5. Theme or effect desired. - hours planting site is available for planting and servicing

Duty: C. Designing and Maintaining Interior Plantscape

Task: C17. Designing Interior Plantings

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
1. Prepare site plan	Drawing pencil, Horticulture reference book, paper		Ornamental horticulture	Reading Visual		1. Include walkways, windows, skylights, physical structures, water outlets, and client's preference
2. Analyze offsite factors						2. Views, noises, and pedestrian traffic
3. Make scale drawing of a: a. Circular group planting bed b. Corner bed						3. Consider: Effect to be created, height, light, texture, color, water requirement, level of maintenance
4. Indicate types of plants for both types of plantings						4. Include both common and botanical names
5. Indicate use of mulches						
6. Obtain client's approval						5. Consider effect to created

Task: C18. Selection of plant materials and supplies

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Select plant and construction materials as indicated on the interior plantscape design to include:	Plant reference material		Ornamental horticulture Landscape architecture			
1. Landscape a. Trees b. Shrubs c. Vines and ground cover						1. Select acclimatized plants of suitable size and shape for designated location
2. Type and amount of mulch	Mulch					2. Determine amount and depth of the coverage
3. Water system	Hose breaker, self-contained water sprayer					3. Determine sprinkler system or use hand water application ..

495
496

Duty: C. Designing and Maintaining Interior Plantscape

Task: C19. Establishment of Plants

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Establish plants in interior site according to interior scape design:	Plants, truck, clippers, hand truck, shovel, transplant spade, soil amendments		Ornamental horticulture Landscape architecture		Visual	
a. Prepare plants for site						1. Acclimatize plants a. to the interior environment b. groom unsightly leaves
b. Transport plants to site						2. Protect the plants while moving them
c. Transplant them into the bed or decorator container	Decorator container					3. Prepare the soil: dig hole, plant at proper depth, replace soil, water.
d. Apply mulch	Mulch					4. Select and apply mulch according to design specifications

Duty: C. Designing and Maintaining Interior Plantscape

Task: C20. Maintaining Interior Plantscape

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Prepare schedule for maintaining interior plantscape to include			Ornamental horticulture			
a. Fertilization	Fertilizer					1. Type and frequency of fertilization
b. Watering	Water meter, hose breaker					2. Method, amount of frequency of application
c. Grooming	Scissors, clippers					3. Remove unsightly leaves and flowers, pruning, trimming, staking as needed
d. Pest control	Pesticides, sprayers	Safety precautions should be utilized				4. Regular inspection for disease, pests and weeds in the planters

Duty: D Interpret laws regulating the landscape industry

Task: D 21. Interpret Laws regulating the landscape industry

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Interpret laws regulating the landscape business at the city, county and state levels 1. Occupational licenses 2. Applicators licenses 3. Planting code and regulation	Local, county and state laws		Ornamental Horticulture Landscape Architecture	Reading		1. Business license 2. Restricted chemical use 3. Tree ordinance, specification of size, number of trees per given area. Planting/unit area

Duty: E. Demonstrate Leadership, Employability, Communication and Human Relation Skills

Task: E22. Prepare planting instructions on balled and burlap stock and on container stock

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Prepare clear and concise written planting instructions to include:	Saleable balled and burlapped shrub		Ornamental horticulture Soils	Written		
a. Planting season	Container stock					1. Dormant or active growth
b. Good planting site						2. Sun/shade/drained/moist
c. Preparation of planting hole						3. Planting depth and width
d. Preparation of backfill soil						4. Addition of maure and organic matter
e. Handling ball						5. Removal of plastic wrap
f. Filling the hole						
g. Watering and fertilization						6. How often and the amount to water and fertilize
h. Mulching						7. Types and methods of applying the fertilizer

Duty: E. Demonstrate, Leadership, Employability, Communications, and Human Relations Skills

Task: E23. Taking phone orders and writing customer orders

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Write up order form from information provided by phone in following order: a. Determine product customer desires b. Delivery date c. Fill out form and file	Customer order forms, pencil or pen			Verbal Written		1. Product description (quantity, price) 2. Customer's name, address, phone number, credit number, delivery charges if any, mode of payment 3. Order date/delivery date

Duty: E. Demonstrate Leadership, Employability, Communications, and Human Relation Skills

Task: E24. Provide verbal information on care of evergreen trees, deciduous plants & house plants

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Provide clear verbal information on the care of - evergreen trees - deciduous trees - house plants to include: a. Name of plant b. Watering practices c. Fertilization practices d. Disease and pest control e. Light requirement and temperature f. Seasonal care	Selected evergreens, deciduous plants and house plants			Written Verbal		1. Common and family names 2. Amount & frequency of watering 3. Type, frequency, time of year to fertilize 4. Type of pesticide, safety precautions 5. Sun/shade 6. Pruning, training and staking

Duty: E Demonstrate Leadership, Employability, Communications, and Human Relations Skills

Task: E 25. Follow up landscape project

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Follow up landscape project to inspect quality of work completed to include: 1. Compare landscape against plan. 2. Grade changes 3. Plant materials 4. Site condition 5. Customer relations	Completed landscape site. Landscape drawings, landscape specifications.		Landscape Architecture Ornamental Horticulture	Reading Verbal		1. Plants and construction conformity to plan. 2. Slopes, ridges. 3. Establishment of maintenance of plants. 4. Tools and equipment, building supplies removed from site. 5. Job satisfaction with plant material, landscape appearance cost.

Duty: E. Demonstrate Leadership, Employability, Communications, and Human Relation Skills

Task: E26. Aid customer in the selection of tree or shrub, flowering and house plants

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Advise customers on selection of - trees and shrubs - flowers - house plants to include: a. Type of plants desired b. Environmental conditions plants will be exposed to c. Purpose and qualities desired d. Maintenance level desired	Tree or shrubs, flower plants, house plants					1. Growth habit: vining, weeping, bushing, conical, pyramidal 2. Sunlight/shade, soil type, and water frequency 3. Size, shape, color, height, and growth habit 4. Time

Duty: E. Demonstrate Leadership, Employability, Communications, and Human Relations Skills

Task: E27. Fill customer order for plants and merchandise

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Select and tag the merchandise to fill customer orders:	Customer, available inventory					
a. Record delivery data				Reading Writing		1. Customer's name, address, time and date of delivery, quantity, type of merchandise
b. Determine the merchandise desired by the client						2. Tag merchandise, prepare bill, note backorders
c. Move merchandise to delivery or pickup area						

Duty: E. Demonstrate Leadership, Employability, Communications, and Human Relations Skills

Task: E 28. Demonstrate use of spreader

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Demonstrate the proper use of a spreader to include: 1. Define use of spreader. 2. Give advantage and disadvantages of types of spreaders. 3. Operation of spreader. 4. Demonstrate spreader. 5. Explain safety procedures. 6. Demonstrate proper cleaning and storage of spreader	Spreader Owners Manual	Explain safety procedures as listed in owners manual.	Lubrication oxidation	Verbal		1. Spreading fertilizer seed. 2. Drop or rotary type. 3. a. Calibration b. Function mechanism c. Transport of spreader 4. Use of various speeds. use of accessories achieving maximum cover. 6. Techniques, cleaning and oiling to prevent rust and corrosion. Storage to prevent loss of tools.

Duty: E. Demonstrate Leadership, Employability, Communications, and Human Relations Skills

Task: E29. Describe purpose and quality of merchandise

Activity	Tools and Materials	Safety Hazards	Science and Math Skills	Communications Skills	Psychomotor Skills	Key Points
Describe purpose and quality of merchandise to customer to include:	Customer, planting equipment		Ornamental horticulture	Verbal		
a. Brand and generic name of product						1. Manufacturer's trade name and model number
b. Use of merchandise						2. The types of plant materials equipment is suitable for
c. Limitations of merchandise						3. Power source and shelf life
d. Demonstrate the merchandise						4. Proper usage and safety precautions
e. Describe the maintenance						5. Cleaning, storage, availability of parts
f. Features						6. Safety features, guarantees, price, warranties, quality and performance